UNITED STATES OF AMERICA
NUCLEAR REGULATORY COMMISSION

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NUCLEAR REGULATORY COMMISSION

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BRIEFING ON STATUS OF ACTIVITIES WITH THE CENTER

FOR NUCLEAR WASTE REGULATORY ANALYSIS

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PUBLIC MEETING

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Nuclear Regulatory Commission

One White Flint North

Rockville, Maryland

Thursday, April 6, 1989

The Commission met in open session, pursuant to notice, at 9:30 a.m., the Honorable LANDO W. ZECH, JR., Chairman of the Commission, presiding.

COMMISSIONERS PRESENT:

LANDO W. ZECH, JR., Chairman of the Commission

THOMAS M. ROBERTS, Member of the Commission

KENNETH M. CARR, Member of the Commission

KENNETH C. ROGERS, Member of the Commission

JAMES R. CURTISS, Member of the Commission

STAFF AND PRESENTERS SEATED AT THE COMMISSION TABLE:

SAMUEL J. CHILK, Secretary

WILLIAM C. PARLER, General Counsel

HUGH L. THOMPSON, JR., Office Director, NMSS

ERIC BECKJORD, Director, Office of Research

Research

ROBERT BERNERO, Deputy Office Director

P R O C E E D I N G S

(9:30 a.m.)

CHAIRMAN ZECH: Good morning, ladies and gentlemen.

Today the Commission will be briefed by the staff on the status of activities with the Center for Nuclear Waste Regulatory Analysis, located at San Antonio, Texas. The briefing will be conducted by the Office of Nuclear Materials Safety and Safeguards and the Office of Nuclear Regulatory Research.

The Center was established in October of 1987, when the Nuclear Regulatory Commission executed a contract with the Southwest Research Institute in San Antonio, Texas.

The Institute is a non-profit organization with expertise in applied engineering and physical sciences. The Center is currently under operation as a federally-funded research and development center. I understand that the Center is in transition from startup phase to full operational phase at this time.

The Commission is interested to hear about the status of operations at the Center, the current technical research activities and the projects the Center plans to undertake in the future.

Copies of the slide presentation, I understand,

are available at the entrance to the meeting room.

Do any of my fellow Commissioners have any comments they wish to make before we begin?

(No response)

CHAIRMAN ZECH: If not, Mr. Thompson, you may proceed.

MR. THOMPSON: Thank you, Mr. Chairman.

As you know, the Center has been a key element in the staff's review, planning for the high-level waste, the repository licensing activities at Yucca Mountain. It is an important area for us to have qualified individuals there, as well as the qualified individuals on our staff. And we are working together to do the review aspects associated with it.

Mr. Bernero now, who has replaced me as the Office Director in NMSS, has the key responsibilities for implementing that, and he will be leading the briefing today.

Bob.

CHAIRMAN ZECH: Thank you very much.

Mr. Bernero, you may proceed.

MR. BERNERO: Members of the Commission, as you can see, Eric Beckjord is here at the table with me, and we're going to be covering the technical assistance and research work at the Center. I will give the briefing

but, in the dialogue, feel free to interrupt and ask questions and, of course, we can talk about both the research and the tech assistance.

We also have in the audience some of the key people, the two key division directors, Bob Browning in NMSS and Guy Arlotto in the Office of Research, Jesse Funches, from NMSS, who has a new, more significant management role in handling the work at the Center--that's a recent change, and I will be referring to that later -- and Ed Halman, from the Division of Contracts, in the Office of Administration is here.

John Latz, the President of the Center, is present in the audience, as well as Wes Patrick, who is the Technical Director for it.

May I have slide 1, please?

(Slide) The outline of the briefing today is basically to give you a feeling for the status of the Center, building on what you said, Mr. Chairman, about this transition from the startup phase to an operational phase, and then I intend to cover current activities in technical assistance and research, discussing some of the products that are now beginning to appear from the Center, and our future plans and activities, this will be the way to cover it.

May I have the next slide, please?

(Slide) Recall, please, that last October we sent to you a paper, SECY 88-285, that provided the context in which it is useful for you to consider how the Center support is needed and to be used. That paper, SECY 88-285, covered the strategy and the schedule for licensing -- and remember that our target is to have a three-year hearing, license application and meeting the statutory objective of a three-year hearing -- and we set down --

MR. THOMPSON: I think it is a three-year licensing process. I think the hearing phase is --

MR. BERNERO: Yes. Excuse me, that was misspoken. It is a three-year application to hearing finally.

CHAIRMAN ZECH: Yes, I'm glad you clarified that.

MR. THOMPSON: People may think there's going to be a three-year hearing, I know, and --

MR. BERNERO: No. We will have failed, if that's the case. But we set down a strategy for the years in advance of that, four years or so, 1988 to 1992, for key rulemaking activities, whereby we could get the significant uncertainties, sort them out ahead of time, and deal with them in advance, so that the process of the license application and licensing decision was a much more

disciplined and straightforward one.

So, we have these program elements and, for your convenience, I have just copied the key figures from that previous SECY paper, they are behind there. They illustrate the timing and the three major program elements of a regulatory framework resolving uncertainties, NRC developing its independent review capability, and that includes codes for analysis, independent analysis, and our prelicensing reviews and consultations with DOE in advance of the application, and these are all very important.

We are now in the second year of the Center contract -- and may I have slide 3, please?

(Slide) In the second year of the contract, roughly halfway through, probably the most illustrative figure to give you an overall status of the Center's activities is the staffing chart. And this little chart here, if you look at it, shows you on the left-hand side of the vertical line is the actual progress and then projected progress to the right, and the dark part of the graph is the support staff -- this is the overhead at the Center, total employees -- and then the cross-hatched part is the technical staff.

Right now we have 23 technical and eight support people at the Center. At the end of this fiscal year, this chart illustrates, we still have eight support, but

35 technical is the objective, and then by the end of fiscal year '91, we expect the support to be up to about 13 and the technical should be about 50.

We stay in close touch with the Center. They have had some difficulty in hiring some key skills--geohydrologists, rock mechanics, mining engineers with experience. My impressions are that the Center is very careful in how they are hiring, and they are hiring good people. So, leavening their bread with a little caution, we support them in that.

And, basically, we see that they are building up essentially on the projected curve. And we are confident now that they are sufficiently large in technical force that they can truly be viewed, though still building up, as an in an operational phase, that they are no longer just the raw startup crew.

May I have slide 4, please?

(Slide) So, if they are operational, we would like to then turn to activities that are going on right now -- what is happening? What are they doing? What's coming out of it?

First, I want to cover the technical assistance projects, and I've got four listed here. These are the major ones -- system analysis. That's the term I prefer. Some of you have heard it many times as program

architecture. The second one is the engineered barriers, determination of compliance with the regulations. Then we have, off to one side so to speak, the transportation risk study, a very important element. And last, and certainly not least, the site characterization plan and exploratory shaft facility reviews, where the Center is participating with us.

May I have slide 5, please?

(Slide) The program architecture, or system analysis -- and, again, I prefer system analysis or systematic analysis, if you prefer. I am quoting here from the contract, and just to illustrate exactly what they are supposed to do, "The Center is supposed to develop a capability to provide systems engineering and integration support". And they will then recommend a program architecture based on complete regulatory systems analysis of relevant requirements, statutes and so forth.

Now, they are doing this. Some of you have been to the Center, and you've certainly seen some of the literature. I have attached, as a backup slide in your packet, the logic diagram of the 22 steps of how one goes through and analyzes requirements and recycles information, and so forth, but the important thing is the Center is now doing this activity, and it's beginning to fold right into the program and play a significant role.

If you go to slide 6, please.

(Slide) The products in system analysis, really, there is a capability product in April of '88 and December of '88, and that was to develop the software and the analytical capability to do the system analysis, and to demonstrate it, and then get down to business in the year 1989, to really do the work and start generating products, getting them into the regulatory process.

I've carried into the meeting here one of the first major products in the nomenclature of the system, it is called R-9. It just came in, literally. It is the analysis of regulatory uncertainties related to the site characterization plan and the exploratory shaft facility -- the third item listed on this slide here -- and it is a very useful one, in that it goes into the site characterization plan, in congruence with their review of the site characterization plan, and they are analyzing the uncertainties, the regulatory or technical uncertainties that lie there insufficiently or unclearly resolved.

And I have had the pleasure of an advance draft copy of this, so I had a chance to read it from cover to cover, and it is a very thorough piece of work. And what we are finding is that it is useful in the process because it is this discipline that we are looking for. The program architecture or system analysis is a discipline of

understanding uncertainties, getting the important ones up front, and making sure they are sufficiently resolved, so that the entire licensing process can proceed as planned.

And what we are identifying here is a host of uncertainties inter-related and certain programmatic features. When you look at the site characterization plan, and look at this, one of the things that is beginning to come out to us, and we are talking about it right now, is that the Department of Energy needs to get their own performance assessment on the table very soon. It is not in the site characterization plan. And more and more it looks like it is a fundamental part that needs to be on the table, either in the plan, or parallel to the plan, in order to take these technical issues and identify whether the degree of knowledge that is obtained, or will be obtained, is sufficient about a physical parameter, and the degree of sensitivity which the outcome has to that particular parameter.

And that's where the performance assessment, as it an iterative process, continually evaluating all the parameters of interest and coming up and saying you don't have enough information on this one, or, we hope, that will identify any number of them where we do have enough information to make judgments, or the system is not terribly sensitive to it.

COMMISSIONER CARR: Is DOE working that problem?

MR. BERNERO: Pardon?

COMMISSIONER CARR: Is DOE working that problem?

MR. BERNERO: Well, they are certainly doing performance assessment work, but that is probably going to be one of our major comments on the site characterization plan, that it is not included. It is not directly included in the site characterization plan, and it appears to be a parallel effort, and perhaps should be moved up to be a more explicit and leading effort.

COMMISSIONER CARR: I am not sure what it is that you are telling them that you want them to do.

MR. BERNERO: Get it on the table, get it on the table, and do the sensitivity analysis.

COMMISSIONER CARR: Get what on the table?

MR. BERNERO: The performance assessment.

MR. THOMPSON: The performance assessment approach, as I understand it -- they are still struggling with exactly how to do the performance assessment, even at the WIP facility.

So, I don't think that it is very clear what they intend to do, and I think that is part of the uncertainty in evaluating the site characterization activities --

COMMISSIONER CARR: Well, is it clear to us what

they ought to be doing, or is it equally unclear to us?

MR. BERNERO: No, no. No. I would say it is clear to us that they have a development program, a performance assessment, and they need to have a reference performance assessment selected and on the table very soon, which is used to evaluate the state of data that they have on the site now, and the sensitivity of the outcome to the various parameters involved. They need to have that.

In a way -- if I could go back to a thing I often do, making analogies to a reactor -- if you were designing a new reactor, and you said do a PRA for the reactor design and we are going to incorporate that knowledge to refine the design, you can say in advance that -- if it is a pressurized water reactor, the auxiliary feedwater system is going to be pretty important and the high pressure injection system is going to be pretty important, and da de-da de-da, you know, right down the line. But you won't have a good feel for how important, and you won't be able to evaluate the development and characterization of that design, unless you have a reference analysis that cycles back and forth, iterates, and says here is how important it appears today, that the auxiliary feedwater system is.

And, so, when we go into all of the potentially

adverse conditions -- if you go in our regulations, our regulations tell you that you have a whole catalogue of potentially adverse physical conditions -- you know, geochemistry and hydrology and all sorts of things like that -- and when you try to evaluate how significant is the potentially adverse condition, you need to know how sensitive the system is at that site, in that context, and you have to also know how much do I know about that particular parameter. You may know an awful lot about it already, or you may not know very much at all, but the important thing is to use that state of knowledge and to develop a reference performance assessment that can be used as you go along, refining the process.

COMMISSIONER ROGERS: Yes, just on this question of what you mean by uncertainties, I was under the impression that at least part of this review was to look at ambiguities, or lack of precision in our own regulations with respect to this whole business, not-- and what you seem to be talking about is another aspect of uncertainties, uncertainties as to what extent those regulations can be satisfied by certain proposed pieces of information or courses of action.

Where do we stand with respect to an analysis of our own regulations as they are today, with respect to ambiguities and uncertainties in them, as they are written

down now?

MR. BERNERO: Well, can I have the next slide, please, slide 7?

(Slide) The next product we have coming in-- and in the nomenclature of the system is called R-8, in case you have some familiarity with that. It is listed as the first April '89 product on this. The Part 60 licensing and technical criteria and regulatory actions, basically, this -- now, I haven't read this one, but we've had access to the draft -- it identifies 75 uncertainties and ranks them according to their attributes of importance -- timeliness and other factors -- and a key element of it is to see if we have the right suite of rulemakings.

You will recall last fall's strategy paper. That, you could say, was general logic or intuitive logic, to say we have to follow this strategy of rulemaking. And this is where we can come to grips with our own licensing regulation. This is the first opportunity we have there, to sort that out and identify regulatory ambiguity, or gaps, or contradictions, if such are found.

COMMISSIONER ROGERS: Are you saying that that's been done? The corrective action hasn't necessarily been done, but the uncertainties have been identified?

MR. BERNERO: I believe it is fair to say that

uncertainties concerning the SCP and ESF, are you really looking there, as you have described it, for shortcomings in DOE's information, to satisfy regulatory requirements that are certain, or does that also -- does the R-9 milestone product also cover uncertainties in our regulations?

MR. BERNERO: Well, I will just quote from it, and that's why I brought it to the meeting. And I recommend it, to your at least scanning it -- it is a pretty thick report.

From the very introductory section, the uncertainties are embodied in the following phrases, in 10 CFR 60.122, and 10 CFR 60.122 is the section I referred to earlier, that catalogues all the potentially adverse conditions. And the two quotes from 60.122 are, "Taking into account the degree of resolution achieved by the investigations" -- in order words, how much data do you have on that particular thing and, secondly, "not to affect significantly the ability of the repository to meet the performance objectives relating to isolation of the waste".

In other words, 60.122 basically says, be sure that you look at Item 1, Item 2, Item 3 in all these potentially adverse conditions, and the test of whether you are looking them adequately is, how much do you know

this product will include them.

MR. THOMPSON: That is due this month, I guess, is what we are saying. So it should be coming in shortly, though I don't think Bob or I --

MR. BERNERO: Yes. Now, a little bit later this year -- and that's the other product on slide 7 here -- we are trying to complete the system analysis through the entire 22-step logic -- you know, the figure you've got attached as a backup -- for erosion, substantially complete containment and adverse geochemical effects. The three things we are trying to really go all the way, as deeply as you can go, to understand those.

For instance, substantially complete containment, that is one that some people -- at least I have some misgivings about the clarity or consistency of the regulations on what does it take to demonstrate substantially complete containment? You keep coming up to the subject of containment in the can lifetime, the canister lifetime and things like that. So, I think especially in that one, this will be our opportunity in 1989, to bore in and find critical gaps, or critical even contradictions in the regulatory requirements.

COMMISSIONER CURTISS: Let me go back to slide 6, and make sure I understand your R-9 milestone. When you say you are going to analyze the regulatory

looking there, as you have described it, for shortcomings in DOE's information, to satisfy regulatory requirements that are certain, or does that also -- does the R-9 milestone product also cover uncertainties in our regulations?

MR. BERNERO: Well, I will just quote from it, and that's why I brought it to the meeting. And I recommend it, to your at least scanning it -- it is a pretty thick report.

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In other words, 60.122 basically says, be sure that you look at Item 1, Item 2, Item 3 in all these potentially adverse conditions, and the test of whether you are looking at them adequately is, how much do you know about them, and how sensitive are you to them, these

know about them, and how sensitive are you to them, these parameters.

COMMISSIONER CARR: I.e., what's the probability you are right, huh?

MR. BERNERO: Well, if you are not sensitive to it, the thing -- you could have very crude data, but you can use a simple bonding analysis and get the thing behind you, and don't go chase the data because the outcome will be the same, whatever it is. You can eliminate that as an uncertainty.

But on the other hand -- in fact, I often shudder when people use the expression "is there a show-stopper"? Is there something going to stop the repository, say it is clearly unacceptable. And people use that expression as if one would suddenly discover an underground lake, or a huge cavern, you know, some physical feature that was totally unsuspected.

And, actually, a "show-stopper" on a repository review will probably be a whole host of potentially adverse conditions that don't go away, that you are sensitive to, and you don't have enough data on and, as you keep working at it, they keep moving ahead of you, and you are still sensitive to them, and you still don't have enough data.

And that's probably how you will find the site

is unacceptable, is, you just don't quite come to grips. You never reach a level of satisfaction.

And our regulations have spelled out all of these potentially adverse conditions. And our regulatory requirement is, basically, you have to look at them and you have to show that you know enough about them. And there are two aspects of that showing, and they are the ones I just quoted.

COMMISSIONER CURTISS: Let me go back to that earlier point. It looks to me like two issues are intersected here; one, the question of regulatory uncertainties in 10 CFR Part 60 and the related regulations that will be used to assess the performance of the repository and, two, the question that Commission Carr has raised, that has to do with once you've got a certain regulatory requirement, how much information do you need, with what degree of conservatism, to demonstrate in the performance context, whether you comply with a clear and certain regulatory requirement.

I guess I have two questions. One, from the standpoint of the chronology of this effort, will we be in a position to identify and resolve the regulatory uncertainties, before we get to the question of assessing the performance and evaluate the DOE's information?

And, two, to the extent that we won't, to what

extent will this uncertainty, or our search for additional information, be a product of uncertainty in our regulation, and not a product of the kind of conservatism we want on a clear and certain regulation?

MR. BERNERO: I think with our system analysis and the rulemaking strategy that we have right now, I think we can say at this time that we will be able to follow the set strategy with some confidence, or refine it within the next year or so, to be able to resolve the early significant regulatory uncertainties, where they are -- uncertainties about what do we really want. That's the one I -- my favorite is, what do you really want in substantially complete containment? What is the true requirement -- because there are so many ways to say it, and so many, apparently, overlapping requirements, and that is a regulatory uncertainty, insofar as it identifies the true nature of the requirement.

It isn't a whole lot different, though, when you come to the 24 potentially adverse conditions. And the regulation did not say demonstrate by a performance assessment that there is a sufficient body of data, et cetera, et cetera. The regulation does not say that. The regulation just says 24 potentially adverse conditions at the repository, taking into account degree of resolution and those words I quoted.

So you could say that that, too, is a regulatory uncertainty about what we really want. What does it take to satisfy those words? And the system analysis the Center has done, and what we are working with here -- and, remember, this comes into the regulatory process and goes back and forth, as we develop this. I personally am convinced that what the regulation means is that you need to demonstrate by performance assessment, (a) you've got enough data, and (b) you understand the sensitivity to it.

COMMISSIONER CARR: We've got to be very careful, there is no doubt we can clarify those uncertainties such the repository will never be built and never could meet them.

MR. BERNERO: Well, we have -- you see, we have a regulatory finding. Ultimately, the regulatory finding behind all of this is that there is sufficient isolation from humankind, that this hole in the ground is good enough, that that is sufficient isolation.

And then we have layers of regulations and performance standards that describe how one can make that finding. And then when you come down to it, you do get regulations such as this, that said here are 24 potentially adverse conditions. And these are drawn from the knowledge of geoscience, hydrology and all of the appropriate disciplines, but exactly what does the

regulation mean, and exactly what does it take to resolve it is something that comes out of analyzing this thing and carrying it out to the appropriate degree, to demonstrate that on those 24 potentially adverse conditions, you know enough, and you can make a finding of --

COMMISSIONER CARR: We're back to the point where we're not going to get zero risk.

MR. BERNERO: Oh, no, no question, no question.

COMMISSIONER CARR: It is a question of how much risk is acceptable.

MR. BERNERO: Yes, the regulation clearly doesn't say the only acceptable site is one that does not have any of these potentially adverse conditions. You know, you are never going to find a site that gets zero on all 24.

CHAIRMAN ZECH: All right, let's proceed.

MR. BERNERO: So, if I turn to slide 8-- (slide) -- another technical assistant project that is going on is the engineered barrier status. This is getting into the containment, substantially complete containment thing, and the important activities at the Center are the CONVO Code, which was developed for the BWIP site, had to be taken up by the Center. And they had to evaluate it and start enhancements in order to use it for the tough medium and unsaturated medium, and they have

been doing that.

And they have also gone into methodology, as the slide indicates, to develop fast probablistic performance assessment methodology for quickly drawing conclusions from parametric analyses and being a much more efficient process.

They had a report product last October. I had the pleasure of looking at that one myself because of my long-standing personal interest in the field, and they are doing a good job there, I believe. And they are continuing their work to develop this CONVO code. And this will be instrumental in the NRC's independent analysis of the performance of the container, the engineered barrier system.

This is one of the major features of the repository system, and one of the places where we feel we must have the capability for independent analysis, systematic analysis, and that's going on right now. Yes, sir?

COMMISSIONER ROGERS: Before you leave the fast probablistic performance assessment methodology, has that -- has the Center offered any publications and referee journals on this, to get a reaction from peer review groups?

MR. BERNERO: I couldn't answer that question.

They have filed a report with us but, I'm sorry, I don't know the answer to that.

COMMISSIONER CARR: Are we publishing the report?

MR. BERNERO: Wes Patrick.

CHAIRMAN ZECH: Well, will you step to the microphone, please, and identify yourself for the Reporter?

Thank you.

MR. PATRICK: Wes Patrick, Center for Nuclear Waste.

We have issued two reports to the Commission, which are internal documents that, of course, are in the Public Document Room, so those are available for broad consumption. We have prepared an abstract, which was accepted for presentation at one of the leading international symposiums on nuclear waste. So that will be presented this fall, that document will be going out.

And it is our intent, although we have not yet prepared a paper, to go into one of the leading journals, referee journal on probablistic and numerical methods. So, we are very keenly interested in getting the technique out, and getting it reviewed. The technique, vast probablistic performance assessment, is getting a lot of attention in the NASA aerospace arena. It is a technique

that is specifically being used, for instance, for material life prediction for space station considerations there.

CHAIRMAN ZECH: Thank you very much.

Let's proceed.

MR. BERNERO: Okay, can we have slide 9, please?

(Slide) Another arena of activity in the technical assistance work at the Center is in transportation. The Commissioners may recall that in 1977, NRC published NUREG-0170, Transportation By Air and Other Modes, which was a transportation environmental impact statement, back at a time when we had rulemaking considerations about overall changes in transport regulations. And that's been a benchmark study. Now, 11 years later, we're initiating what amounts to revisit of the subject, to see whether we ought to do something else.

We have an interim report coming in, in September of '89, and the final report in September of 1990, which would then tell us you have the technical information to support where you are, or you ought to go in another direction and change something.

We are actually following a Commission directive to stay very close to transportation risk. As you well know, and I am sure it is part of the basis for your directive, is that the public perceives the transportation

risk as a very significant one. It is something they can see -- here comes the truckload, or trainload of high-level waste. And it is a very strong concern in the public, especially when they say one waste site and the waste from all over the nation is going to converge and some states have already suggested that they are corridor states, uniquely vulnerable condition, and so forth.

Now, that identifies an issue that is not clear at this time, and we will be in continuing touch with the Commission on this. The technical work is being done by the Center, toward a substantial re-evaluation of risk. But whether it will ultimately take the form of simply a technical report or an environmental impact statement is yet to be determined because, in this particular instance, we have a lot of rulemakings going on, but we don't have anything in the way of transportation rulemaking, of any significance.

Now, if we determine from this technical work that a major change was appropriate then, of course, we would probably have some sort of statement associated with that. But in contrast, if we do not so determine, if there is no need for major change, then this would become the supporting basis for a negative declaration, or something like that.

That's an issue that may be discussed in the

future, about whether we put out any EIS here because, for the repository, it is a Department of Energy EIS that we will adopt.

MR. THOMPSON: Well, yes. The repository, though, focuses primarily on localized transportation issues, more than the kind of national perspective that our regulations cover.

The other aspect was the original NUREG that was put out, was based on a reprocessing concept and the transportation associated with that, as opposed to the transportation scheme that is kind of set out now. So, those are some of the key issues that are being looked at.

COMMISSIONER CURTISS: Let me ask a quick question on that. Under the Act, DOE is going to be responsible for taking title to the waste and transporting it. And any action that might be a major federal action under NEPA, will be a DOE action, I take it? That they'll, in turn, have to prepare an EIS for.

What is the relationship of this work to what DOE is or will be doing in this area?

MR. BERNERO: Well, that's the issue we are trying to pull down and clarify. From what I have seen so far, DOE seems to be focusing their work on the State of Nevada, the impacts locally within the state, about whether everything comes through Reno, or comes the other

way around, and which railway spur and so forth.

They don't seem to have that national perspective from every reactor site to the -- you know, the entire transportation network, and it is important that they do. And it is not our intention to do an EIS for them.

COMMISSIONER CURTISS: If they don't have that national perspective, I suspect that they'll need to and will have at some point. If it's a DOE action, I guess the question that I have is, to what extent do we need to initiate a full-blown transportation analysis that would then lead to answering this last question if, at this point, adoption of DOE's EIS might be an option that would preclude the need to expend resources in an extensive way on the preliminary work?

MR. THOMPSON: I am not aware of any plans right now by DOE, that is associated with taking title and doing the transportation of it, that they are preparing an EIS on that issue. That may be something we will need to explore with DOE.

MR. BERNERO: Well, actually, as I understand their intention, they are preparing the fleet of casks, the transport fleet. They will operate them, and they will, indeed, take title, either at the spent fuel pool, or at the dry storage device that is used -- in other

words, at the reactor site.

And my understanding of their scope of EIS for the major federal action is, with or without an MRS -- I mean, just assume for a moment the MRS is somewhere in the network -- the entire spectrum of activities -- taking possession, transporting into and out of an MRS, if it is there, and into the repository -- is the scope of their action. And that should be the EIS that we are prepared to adopt -- you know, that separate rulemaking we have.

COMMISSIONER CURTISS: Right.

MR. BERNERO: In our case, if we determine that we've got to change the rules then, of course, we need this as an environmental impact statement backup for what we are doing to the regulations but, absent that, we don't intend to generate a part of the EIS for DOE, or expend resources necessary to do that.

May I have slide 10?

(Slide) Another part of the Center's technical assistance activity is the review of the site characterization plan and the experimental shaft facility. The slide here gives the comments, as they are, on the different portions of the documents in question, the four products, actually, four individual products.

We decided after the startup of the Center, that it was a good idea to get them involved early in the work.

Recall, when the Center contract was first let, we had the multiple site agenda. We were in the middle of a situation where the Congress was changing the ground rules about how many sites were being developed at once. And that led to the Department of Energy shifting from three site characterization plans to a single one, in consultation draft form, which we looked at a year ago, and now to this one, which is the official site characterization plan for Yucca Mountain, and because of that evolution of the DOE program, we thought it a good idea to get the Center involved, get into the real evaluation. And I think this is paying off very nicely because their generic work, like the system analysis of regulatory uncertainties, and things like that, benefits greatly from their direct technical application to the plans, to see what is in there, what isn't in there, and to get that full flavor.

So this is paying off rather well. We are quite pleased with it.

Now, I would like to turn to the high-level waste. And there is a backup sheet behind this slide 10 that would probably show on the screen, too, Barbara, if you could put it up there. It basically illustrates the full range of activities for research, for independent research that the NRC could do and, if you look in there,

you can see groundwater migration, radionuclide migration in the unsaturated medium, the effects of fracturing, things like that.

If you look at the little arrows coming over by the repository, on the right there, the effects of heat, sealing of shaft seals, and long-term waste package performance is a very important one. Remember, our whole regulatory approach is one of defense in-depth, where the manmade portions of the system, the engineered barrier system, are defending in-depth with the geological setting. So these are all fertile grounds for the research work into high-level waste.

I would like to touch briefly on -- may I have slide 11, please?

(Slide) There are four research projects that I just want to touch on here. The integrated waste package experiments, this relates to the engineered barrier system performance; geochemistry; thermohydrological phenomena and seismic/rock mechanics. These are all current research projects at the Center.

May we have slide 12, please?

(Slide) If you go to integrated waste package experiments it is rather interesting because the regulations specify in two different places things that you should be looking for, two regulatory objectives of

note. The first one listed there is 10 CFR 60.113(a), and that is really saying that containment of high-level waste within the waste packages will be substantially complete for a period not less than 300 years nor more than a thousand years after permanent closure.

I'd like to translate that one a little bit different -- and here, of course, I am interpreting your regulations, as saying at a minimum, the can had better be good for 300 years. And we encourage you to have a longer-lived can, but you won't get credit for anything over a thousand years.

In other words, you can't moot the whole problem of siting, by coming up with a 10,000 year can, and then say I don't care where I put it, it's a 10,000-year can. We want a good can, good engineered barrier system and a good site.

In interesting contrast, that other regulatory objective that is quoted there, alternatives producing lower releases, your regulation 60.21(d) says "The analysis shall also include a comparative evaluation of alternatives to the major design features that are important to waste isolation, with particular attention to the alternatives that would provide longer radionuclide containment and isolation".

Here, again, if I were to interpret your

regulation, I would say it is a lure to the developer to don't idly throw away a 10,000-year can, if that's within reach. What would it cost to have that additional margin?

CHAIRMAN ZECH: That's important because we are not limiting you.

MR. BERNERO: Yes.

CHAIRMAN ZECH: I don't think we are limiting you to a minimum, but we are providing a boundary there that we expect you to at least meet but, if you go beyond that, you will not displease this Commission.

MR. BERNERO: No, no. And, in fact, we want to make sure you look beyond there. That's what the requirement says.

CHAIRMAN ZECH: We are asking you to do that.

MR. BERNERO: Yes, we are asking you --

CHAIRMAN ZECH: We are not limiting you, that's the point. Do you understand what I mean? We are not limiting you.

MR. BERNERO: -- to look towards the long end.

CHAIRMAN ZECH: All right, go ahead.

COMMISSIONER CURTISS: Does that -- on the first one -- excuse me -- does the 300 to 1,000 year interpretation that you've described jump out at you from the regulations?

MR. BERNERO: I think it does, but this is part

of our -- remember, I said earlier, substantially complete containment, and all of the regulatory requirements that go with it. The regulations, as written, have a very interleave network of requirements. And I think that is clearly what the regulation says. And I was a peripheral participant, at least, back when it was written, but this is part of our regulatory requirement uncertainty thing, exactly what does it mean and how is it treated and, similarly, in 60.21.

MR. PARLER: That certainly, Mr. Chairman, is something. If there is any uncertainty, is a candidate to be resolved at as early date as possible and not let that uncertainty get prolonged so that it would have to be debated and resolved in the hearing because a hearing then certainly would not get over in 18 months.

COMMISSIONER CARR: My reading of that says we don't know what we can build. We know we need 300 years, and you may be able to get a thousand.

COMMISSIONER CURTISS: I think that --

MR. BERNERO: Yes. In fact, there's a widespread belief that albeit with greater uncertainty, you can go well beyond a thousand, and there are people who, for political or technical reasons, are striving to do that.

COMMISSIONER CURTISS: I think the important

thing, and one of the reasons I view the systematic analysis initiative as an important program, is that ultimately, in the first instance, the Licensing Board is going to resolve that uncertainty, and we can all sit around and sort of speculate as to what 300 to a thousand means, but before we get to the point of the Licensing Board toiling for months on end, if not longer, over what that means, this initiative, it seems to me, in sort of an organized, comprehensive way, permits us to go through the regulations, identify instances in advance, you know, where there have probably been at least two and maybe three interpretations of that very one here this morning, and tell them --

COMMISSIONER CARR: The uncertainty is not the 300, the uncertainty is substantially complete. You know, 300 is a nice number. If they meet 300, they meet it, and then the question is going to become what "substantially complete" means. So, that's the --

COMMISSIONER CURTISS: I agree with that.

MR. BERNERO: Well, I think we all recognize that if we wait for the Hearing Board to adjudicate just what does that mean, the system will have lapsed badly--

CHAIRMAN ZECH: The General Counsel has made an important point. I hope you'll take that very seriously.

MR. BERNERO: Yes, indeed. I just want to

reinforce his point. We need to address this now, and that's why, in the system analysis -- the substantially complete containment umbrella gets you into this -- we've really got to pursue this thing because it's crucial to all of the work you do and, if one, in adjudication many years from now, discovers that you have to go back to the drawing board and get more information or do more work in order to make the necessary finding, the system has really failed. We just didn't give enough foresight to it.

CHAIRMAN ZECH: Let's proceed.

MR. BERNERO: So, if you'll go to slide 13, please -- (slide) -- the integrated waste package practice -- it's rather interesting. DOE has been working with a family of stainless steel and nickel alloys, half a dozen of them, and when the Center got into this research project, it looked at the addition of hastelloy, another alloy, as a sort of reference material, to get a feel for the conservative side of the spectrum -- you know, in longer-life cans, what one might do -- and what we have right now is a project where materials are being procured and the facilities are being prepared, scoping tests on their way, and so forth.

We are operating on what I'll call a six-plus-one matrix right now -- six alloys plus a hastelloy reference material -- and DOE is signaling that they will

be making a narrowing of the field later this year -- they are going to narrow it to a couple of alloys -- and until this week, I thought, from everything we had heard, that it was going to be stainless steel, and now we hear, no, they may be going toward the noble end of the spectrum, toward incanel, and some of you, I'm sure, remember incanel and its development in the nuclear Navy and much of the work that was done with it there.

So, basically, our research program, though, has this spectrum of materials, and its intent is to give us an independent technical basis to judge those two things, those regulatory objectives. Is it a long enough life for the can, and has the program, the DOE program, looked well enough at the longer-live side of the spectrum.

May I have slide 14? (Slide) The geochemistry research -- there one gets a number of regulatory objectives. I've just listed them here. Note that a couple of them are contained within that 10 CFR 60.122, the potentially adverse effects chapter of the regulations, and the research here is to develop the capability to assess high-level waste data, and they have models for gas and water, rock, waste package interactions, things like that, geochemistry effects.

COMMISSIONER ROGERS: Before you leave that, is the Center's research work here totally dependent on the

USGS samples, or do they have an independent way of collecting samples?

MR. BERNERO: You mean at Yucca Mountain?

COMMISSIONER ROGERS: Yes.

MR. BERNERO: I believe it's dependent on USGS. I would stand to be contradicted, though. I don't think we have independent samples.

CHAIRMAN ZECH: Step to the microphone, please, and identify yourself. Thank you.

MR. PATRICK: Wes Patrick, Center for Nuclear Waste.

There are several different aspects imbedded in your question. One is with regard to site-specific geological and water samples. We would rely upon samples collected at the exploratory shaft and then at-depth.

The leading part of this research, though, looks fundamentally at the materials that are present in the rock, and those are widely published, widely available, from borehole data that has been put out into the literature and, from a modeling perspective, it starts with certain basic groundwater, certain basic minerals present in the assemblage, and it calculates what the waters would be at equilibrium condition. That, right now, is the best that can be done. No one on the DOE side has yet extracted and published the results of what the

water present in the unsaturated zone is. Quite to the contrary. They go to a convenient nearby borehole and pump from that well, from the saturated zone, and use that in their calculations and in their testing. And we've done sufficient calculations at this point, that if we know anything, we know that that water is not like the waters that one would find in the unsaturated zone.

So, the answer is, yes, we are constrained somewhat, waiting for those samples, but we are able, through some very sophisticated geochemical modeling, to bootstrap the experimental activities that are underway, later intending to confirm those.

Does that answer your question, sir?

COMMISSIONER ROGERS: Well, yes, it's just that there have been some quality assurance problems with USGS samples, and it's just a question of whether there's any independent check that the Center, itself, is making on these.

MR. PATRICK: For that reason, we are, at this time, not using any of the samples that have been collected from boreholes because there is not a good pedigree as to where those samples came from, and that's why I mentioned going to the exploratory shaft, waiting until we are able to be there on-site, or using the NRC's on-site representative, to confirm precisely, under our

procedures, where those samples came from, and the conditions under which they were acquired.

CHAIRMAN ZECH: Thank you very much, appreciate it.

MR. BERNERO: But -- Wes, stay there for a moment -- it is my understanding, though, that when that occurs, when the properly drawn or taken samples, USGS or DOE samples, that we would rely on those samples. We would not independently sample the rock, the NRC program would not independently sample it.

Well, we can skip slide 15. Wes has just given a good summary of where we stand there, and the status of that.

We're at slide 16 -- (slide) -- the thermohydrological research. This is basically working toward thermal effects on geohydrology/geomechanics in 60.21, and 60.113, the waste package containment and groundwater travel time, and the extent of the disturbed zone.

The objective of the research is to use laboratory experiments and develop an understanding of these thermohydrological interactions at the waste package, itself, and then over the unsaturated medium and the repository material around it.

The status of it, if we go to slide 17--

(slide) -- is the technology from other sources has been transferred to the Center, and they have the design and initiation of preliminary separate effects experiments just this month, and then through the course of the year, they will be designing the thermohydrological experiments and then, of course, conducting those experiments on into the subsequent year.

COMMISSIONER ROGERS: Is staffing adequate at this time, to carry out that program?

MR. BERNERO: I think they are still trying to get another key individual here. I think this is one of the areas -- isn't it?

MR. LATZ: Yes.

MR. BERNERO: This is one of the areas where they're still trying to get the right person, and that would help a great deal, you know, to get rolling on that.

Let me go to slide 19, please -- (slide) -- and the seismic/rock mechanics. Here, we're trying to evaluate the potential effects of seismic events on the repository structure and the ambient groundwater system. Of course, you effect retrievability, that's one regulatory requirement or objective. The containment of the waste, 60.113, is another one, and the safety of underground openings.

The status of this work, if you go to slide 20

-- (slide) -- no, 20 is two more requirements -- excuse me -- slide 21 -- (slide). Slide 21 illustrates that the Center has done a report of their literature study. They had a draft report in February of '89. The staff has had access to that. The final literature study report is due next month. Later this year, they will have analytical model evaluations, and laboratory studies plan by June.

So, that's a sample of some of the research work that has just begun, basically, in the past six to eight months, at the Center.

Now, I'd like to go to slide 22.

COMMISSIONER CARR: How do we prioritize their research?

MR. BERNERO: How do we prioritize the Center's research?

COMMISSIONER CARR: Yes. How do we know they are working on their most important things first?

MR. BERNERO: Well, we actually work with the Office of Research, to prioritize research from an NRC perspective. What do we want and when do we want it? And then the -- as you'll see when I show you the resources, the bulk of the research goes to the Center based on that priority, so that we no longer go to the Center and do a second order of prioritization.

CHAIRMAN ZECH: Let me ask Mr. Beckjord to

respond to that. How do you prioritize research?

MR. THOMPSON: I'd like Mr. Arlotto to comment on that, Mr. Chairman.

CHAIRMAN ZECH: All right. Step to the microphone, please, and identify yourself to the Reporter.

MR. ARLOTTO: I'm Guy Arlotto, and I'm from the Office of Research.

The key way -- right now, in a transition period, the research has already been in effect at other places. The key element we're looking for now is the transfer of technology to the Center.

So, the issue of prioritizing research principally is through user-need letters from the Office of Nuclear Materials Research. Basically, the prioritization of the research is to make a judgment--given the fact that this is a relatively new technology for us -- to make a judgment of where do we think the large uncertainties are going to come, given the idea that there are -- the elements we are looking at are, one, the container; two, the effects of the heat on the surrounding of the site itself, and the movement of groundwater through the media, Mr. Chairman -- I mean, the movement of water through the media to the groundwater. And, right now, we have only identified and transferred four elements to the Center, and they cover the four things that Mr.

Bernero has already identified.

And the bottom line to your question, Mr. Carr, is that we really do not have an integrated plan for the prioritization of research, simply because the Center and we must get together and see what evolves from this architecture. The answer is, we really don't have one.

MR. THOMPSON: But there is in place, Commissioner, if there is a conflict in programs, that the Center identifies the fact that they can't meet the current schedules in both of the programs, and that's elevated up to Mr. Arlotto and Mr. Browning to resolve or, if they can't get it resolved, Mr. Bernero will resolve the conflict with the Center.

CHAIRMAN ZECH: But are you attempting to get a prioritization of research?

MR. THOMPSON: I think it's --

MR. ARLOTTO: Guy Arlotto. Yes, that we are doing. I have -- as part of our personnel appraisal system in the whole area, I have directed my chief in this area to develop a closure plan for high-level waste, which would include the prioritization of research, working with NMSS. That we will have in a few months.

CHAIRMAN ZECH: Thank you.

COMMISSIONER CARR: And I would assume it's prioritized somewhere in the direction of clearing up the

uncertainties.

MR. ARLOTTO: Yes.

COMMISSIONER ROGERS: Are there any serious negative impacts on following those priorities due to the shortfall in technical staffing, the unfilled spots?

MR. BERNERO: So far, I don't think so, but, you know, you recall that staffing slide right up front has a little dip in it, and we're optimistic that that dip will be -- will go into the recovery from it, but if there is a continuing shortfall, then we would --

COMMISSIONER ROGERS: Does that technical staffing projection reflect, to some extent, research priorities? In other words --

MR. BERNERO: Insofar as we know them now. Insofar as we know them now, but the system itself is self-changing, that as we go through the system analysis and get a better understanding of what drives and what needs to drive the system, it could have a profound effect even on the research requirements and, you know, I think Guy Arlotto referred to that, that, you know, we have to wait for that outcome, if that comes.

COMMISSIONER CARR: Well, in an organization like this, I would not emphasize numbers over quality of people.

MR. BERNERO: No.

MR. THOMPSON: And the center does have a capability to use consultants, you know, to support their lack of ability to hire a particular area of expertise, and that's certainly called for in the contract. So, their ability to have that capability is present. Our preference, obviously, is to have the quality person on the staff, you know, full-time. So, that that, I believe, is essentially the way they make that tradeoff right now.

CHAIRMAN ZECH: All right. Let's proceed.

MR. BERNERO: Okay. Go to slide 22. (Slide) I'd like to just indicate what the future direction of the Center is, and our activities there.

First of all, there was a letter I signed not long ago, about a month or so ago, on an NRC management realignment. Recognizing that the Center had gone from the startup phase into a more operational phase, and it was involving two divisions in NMSS and also a major division over in the Office of Research, I decided to move the program management for the Center up to the staff office associated with the Director's office in NMSS, and that's where Jesse Funches comes in, and Jesse is now the lead manager for Center activity. He's not taking over the technical direction, you know, each division--Transportation, or High-Level Waste, whatever -- they still have the responsibility and authority for the

technical direction, but we feel that this will greatly enhance the effectiveness of the Center as an FFRDC for us, and we can get a better integration of Center work planning with our five-year plan as well because we think that's a very important thing, to work that into a clear congruence.

COMMISSIONER CURTISS: In their latest periodic report, they've touched on the reorganization, and identified that as a -- or they list it under what they call heading of Problems.

MR. BERNERO: Yes, I noticed.

COMMISSIONER CURTISS: In a fairly terse statement here, they say "The Center was advised in the period of February 21st, of an NRC reorganization that will influence the management of the Center. Further assessment of the problem areas and solutions thereto will await implementation of the new organization".

Could you expand upon what the rest of the iceberg looks like there?

MR. BERNERO: Okay. Well, what we have -- I have been down to the Center. I've talked to Mr. Latz and others, but John Latz in particular, about that management change, and Jesse Funches and I have gone to the Center. Last month, we spent a couple of days down there going over management issues. Jesse has since been there again,

and we are working with them today.

I think the words in that report, which I also read and saw it listed under Problems, that this remains to be fully worked out with the Center. We are in the midst of contractual modifications that are necessary to accomplish that change of characters -- you know, you have different people on different control panels and so forth.

As far as the rest of the iceberg, I think the rest of the iceberg is coming up to the surface now, and I'm still sanguine. I still think that this is a good move, and we'll have a smoother operation. We'll have a more rapid attention at a high enough level to resolve problems.

MR. THOMPSON: As far as I can see -- and, of course, the Center is here, you can ask them, too -- the key element was that we wanted to make sure they understood how the new managers would be interfacing with them, and that's what the purpose of the trip down to the San Antonio by Bob and Jesse as well as their interactions up here in negotiating what we call the Fee Award process.

And, so, as far as I -- at least in my overview, the communications have been ongoing. As far as I know, they are well on their way to resolving any concerns or problems that may be there, but certainly you, you know, can ask the Center.

COMMISSIONER CURTISS: Do you envision the reorganization changing in any significant way, the substance or the schedule for the program architecture or the systematic analysis?

MR. BERNERO: I don't envision the management structure change impacting that, but the content -- you know, as I spoke earlier, what we're doing with R-8 and R-9, and we're getting into this business about what does the program now do with the product -- you know, what do we do? Does this lead us in a different direction? That can affect the system analysis, but I don't see this management changing.

COMMISSIONER CURTISS: But the schedule and the substance for the deliverables from the Center, as opposed to what we do with them when we get the reports, you don't envision changing?

COMMISSIONER CARR: Well, we've changed some of the priorities of things we want.

MR. BERNERO: Yes. The feedback mechanism on which we always presume, that can redirect, and has. It has already redirected the system analysis output -- you know, instead of doing this, go do this -- you know, changing the priorities, and we will necessarily get more of that. I think the R-8 -- this is the R-9 product. The R-8 product, I think, is going to give us more, and then,

of course, later this year when we do the things, including substantially complete containment, we'll certainly get into things, I think.

I'd like to ask John Latz if he would speak to the management change. He probably wrote the words two weeks ago, or three weeks ago.

MR. LATZ: I'm John Latz, of the Center. Yes, Mr. Bernero, I did write those words. I think that rather reflects or bespeaks the uncertainties that are imparted to both the written and the spoken word. They were, indeed, terse.

The intent of those words was to simply convey that the recent nature of the change did not yet permit any assessment of its function, and those ongoing problems or the problem areas that had been identified in the prior report, were being addressed in the management transition.

So, I felt it was not really appropriate, in that transitory state, to address or identify op areas that were problem areas.

CHAIRMAN ZECH: Thank you very much, appreciate it. Let's proceed.

MR. BERNERO: May I have slide 23? (Slide) Slide 23 indicates the funding at the Center, for Fiscal Year 1990 and, if you look at it, the technical assistance, or NMSS work, on the left, is a total of $9

million for NWPA-related funds and 86 percent of it is at the Center; $1.3 million is outside the Center -- that is a little bit of work on independent spent fuel storage and some work at the National Bureau of Standards, which is going to phase down to a lower level, so that for the technical assistance work, the very large share of it is at the Center, and will continue to be at the Center.

The Office of Research is the bar on the right, a total of $5 million; 26 percent of it, $1.3 million, is outside the Center, 74 percent at the Center. I think it's worth noting that the non-Center research that Eric Beckjord has, includes a half a million dollar effort at Sandia that is actually phasing down -- it's a technology completion thing -- and it will phase out, approximately phase out, in Fiscal Year '91, so that the Office of Research, assuming the funds are not cut -- you know, the Office of Research, too, will have a large share of its work at the Center.

COMMISSIONER CARR: Well, you know, this is one of my problems. When we set this organization up, we said we were going to -- you said, the staff said they were going to phase all the work into the Center, and I'm still waiting to see that all the work gets phased in and, so, that black box at the bottom bothers me.

MR. BERNERO: Well, from the outset, it was

recognized that there might be some work that, for a unique reason, or unavailability of some special facility, whatever it might be, could be placed outside the Center, and the issue --

COMMISSIONER CARR: Well, why wouldn't we let the Center place that work if it's unique and they can't do it? I thought we set them up to be our experts in this area, and I understand that there is some discussion about the NAS report saying put more universities, and that's been interpreted to mean you've got to keep some of this work at universities, but that's not the way we set the program up when we started. At least, the Commission's guidance was clear. It said we're expecting you -- and it was a gradual phase-in of "all work" over a period of three years, and that wasn't just research.

MR. THOMPSON: Well, I think that's where we've been headed. Eric, I don't know if you want to add anything else to the table here, but we have been looking at putting as much of the activities, you know, with the Center as we can. I know Eric has looked at also this aspect of keeping some work at the University of Arizona and others, and I think that's an issue that we'll be working with the EDO's office, to make sure that balance comes out, you know, appropriately.

The program at Arizona has been one that has

been helpful and, you know, dealing with the issues. They have some unique programs ongoing, and I think one of the things we were looking at is to have that integrated with the Center, such that the Center and, in fact, may even have a satellite aspect, you know, with the University of Arizona. So, that's --

COMMISSIONER CARR: I guess my message is, if you want us to change our guidance, come ask us, but don't ignore us.

MR. THOMPSON: We will certainly do that. We don't intend to ignore you.

(Laughter.)

CHAIRMAN ZECH: All right. Let's proceed.

MR. BERNERO: May I have slide 24. (Slide) I'd like to identify some areas of future Center technical assistance and research, at least the ones we can see right now. Certainly, the system analysis work will, if you will, always have them imbedded in the process of selected rulemakings and technical positions and iteration around that subject.

We intend to draw them a lot more deeply into performance assessment. You know, this is the quantitative performance assessment of the repository system. I'd just like to mention to the Commission that we have minutes of a meeting we held recently with EPA,

about the performance standard. You know, the Environmental Protection Agency has their performance standard back in remand, and they're going to fix it up and repropose it, and they are also being drawn into a more explicit role in the WIP facility and, you know, the WIP facility in New Mexico is a DOE repository that has to meet the EPA standard, but it isn't licensed -- it's, you know, just a DOE evaluation -- and the EPA -- of course, they don't know what capability the Center has, but they raised the prospect that they might possibly seek access to the Center, for technical assistance in performance assessment, if circumstances develop in that direction. We will certainly keep you informed of anything in that direction.

COMMISSIONER CARR: Who wants to seek access?

MR. BERNERO: The Environmental Protection Agency.

MR. THOMPSON: EPA.

MR. BERNERO: Yes. EPA.

COMMISSIONER CURTISS: Do you think that's a good idea?

MR. BERNERO: We haven't gone deeply enough into it to see it. Legally, of course -- I've done it in the past myself -- I've used other people's FFRDCs in order to tap a unique skill, and it's -- you know, there are

mechanisms by which you can authorize that.

One of the things that underlies -- it's a strong concern, I think I've expressed it to this Commission before -- is that you have in the United States the Department of Energy developing two repositories that are to the same ultimate standard, only one is licensed and one isn't, and this might be a good avenue to get a more congruent treatment -- you know, a more consistent treatment.

COMMISSIONER CARR: But we don't have an excess of manpower out there, that we would be going around advertising, I hope.

(Laughter.)

MR. BERNERO: No, no. No. They raised it, we didn't. We didn't raise it, and it's quite speculative at this time and, certainly, it's not at this time, this year, that we're talking about. It would be something, perhaps, a year or so in the future.

COMMISSIONER CURTISS: You'd envision coming back to the Commission before a decision is made, with the pros and cons.

MR. BERNERO: Oh, yes, we would -- yes. Yes. Yes. There are many policy implications of it.

COMMISSIONER CARR: I'm still puzzled on your performance assessment, I guess, but does that mean the

contribution of all these things, we're going to multiply them all together and decide whether we've got the right answer or not?

MR. BERNERO: Yes, indeed.

COMMISSIONER CARR: And do we know how many of those things there are?

(Laughter.)

MR. BERNERO: That's part of the -- we have some key rulemakings that we have -- in that SECY paper 88-285, the ill-named APEs and UPEs -- Anticipated Processes and Events, and Unanticipated Processes and Events -- is a very important rulemaking as to how one segments or selects the events or scenarios that need to be considered because, remember, you're going out to a 10,000-year time period, and then when you get to the 10,000-year time period, you're very much aware that you're talking about events going out even far beyond that, into millions of years, and you have to select and bound what would be considered-what isn't considered; then there's a second rulemaking in that strategy that is how do you demonstrate compliance with the EPA standard, which is an overall-- as you described it -- an overall assessment, take it all into account --

COMMISSIONER CARR: The more contributors you put into this multiplication, the harder it's going to be

to meet it.

MR. BERNERO: Oh, certainly; certainly; certainly, it is, and it's a crucial issue and we did --

COMMISSIONER CARR: We haven't bounded the contributors yet, huh?

MR. BERNERO: No, that's part of our rulemaking. That's part of our rulemaking activity, and we want to sort that out well in advance of the license application. That's crucial --

MR. THOMPSON: I think this probably is -- it's the number one of the rulemaking efforts.

MR. BERNERO: It's the number one. And by the way, their system analysis is reaffirming us in that-- you know, their system analysis from the Center is really reinforcing that. That's a crucial rulemaking. That's a crucial rulemaking.

COMMISSIONER CARR: Okay.

CHAIRMAN ZECH: All right. Let's proceed.

MR. BERNERO: Of course, we will also use the Center on selected DOE study plans, things like that, related to the direct application of information, and things like project decision analysis, or mission plan schedules.

If I have slide 25 -- (slide) -- the research projects which are under development right now, the

application of stochastic analytical techniques to repository licensing. This fits into the whole theme of performance assessment and its use in licensing. As probably important now and will continue to be important, even after the system analysis, a workshop on natural analogues is an activity that's being planned, and that's a very tantalizing one.

There are activities going on here in this country and over in Australia, concerning natural analogues, where it's quite tantalizing that one can get at least some partial confirmation of long-range performance prediction.

COMMISSIONER CARR: What does that mean to me, like the pyramids?

MR. BERNERO: Well, probably the one that's easiest to understand is the one over in West Africa, where there was an underground criticality many, many years ago, and you can still find the fission product distribution around the underground criticality.

Here, a more subtle thing, they're not looking for radioactivity, they're looking for chemical behavior. There is a research project that the Office of Research is supporting, the Vallez Caldera in the southwest, New Mexico, where it is a material like Yucca Mountain, a tough material, and then there's another project, the Alligator Rivers project in Australia that is looking more

-- it's not tough material, but it's looking more at geochemical congruence, and what's stable over the million year period and what isn't -- you know, what their analogous behavior in the geochemistry they're looking at but, basically, you know, so much of this is you're trying to predict what will a nuclide do over a long period of time, and sometimes you're not predicting with great precision, a rate.

What you're predicting is, it's going to be stable. It's going to reach a geochemically stable configuration, won't move, and that's possibly the answer that you need. And, so, it's very tantalizing if you can find a natural analog, something in nature that can affirm -- you know, a geologic deposit that's 10 million years old that demonstrates what you're looking for.

And another project on the evaluation of groundwater at the repository site, a field analog that's being considered. So, basically, what we see for the Center in the coming years is a deep involvement steered in great measure by this system analysis that steers and contributes to the steering of the whole program, the whole high-level waste regulatory program, and their role.

We're pleased so far, with their participation with the site characterization plan review and the value it has for making them an integral part of our activity.

And, so, we see a very significant role for the Center as we go into the full development and operational phase in the coming years. That concludes the presentation, if you have any questions.

CHAIRMAN ZECH: Thank you very much. Questions from my fellow Commissioners? Commissioner Roberts?

COMMISSIONER ROBERTS: A quick one. About two weeks ago, my office got a copy of the award fee determination plan. Is this a change, and what is the purpose of the change?

MR. BERNERO: We made some conforming changes to the award fee determination plan at the time that we were changing the names. You know, we had a change -- who is going to make the finding, the Jesse Funches manager role -- and we made a few other changes as well, in that process. I went over them carefully with Jesse at the time, and I'm sorry I can't remember them. If you'd like, I can have Jesse -- he might be able to remember.

CHAIRMAN ZECH: Why don't you come to the microphone.

MR. BERNERO: Jesse, do you recall the ones other than conforming changes.

CHAIRMAN ZECH: Identify yourself for the Reporter, please.

MR. FUNCHES: Jesse Funches, from Office of

NMSS. The basic changes were made to, one, recognize that the Center was going from a startup phase to operational phase, to place some emphasis on excellent production as they produced product for us. So, there's a combination of changes. One, to recognize that the original ORT plan was based on, primarily, startup, to recognize that the Center was shifting to operation; another one is to reflect reorganization.

CHAIRMAN ZECH: All right. Thank you very much.

COMMISSIONER CURTISS: One quick question. Is that the same as saying that there will be greater emphasis on short-term deliverables, or does it have any effect on the short-term versus long-term?

MR. FUNCHES: It was not intended to imply at all there was greater emphasis on short-term, more of greater emphasis on both long-term and short-term output. I think we did make some minor change, subsequently, to reflect that it was both long-term and short-term, to accommodate Mr. Latz' comments.

CHAIRMAN ZECH: Thank you very much.

Commissioner Carr?

COMMISSIONER CARR: How are we going to keep the Center at the technical forefront of their capability? Are we planning to encourage them to hold workshops, go to workshops? Are we planning to leave that up to them, to

keep themselves abreast of the technology, or do we plan to assist them, or have you thought about that? What kind of plans have we got to do that?

MR. BERNERO: I can't enumerate a specific plan. We are definitely encouraging them to hold workshops, to take a significant role in interactions with DOE, to make sure we understand the DOE data as it develops, and to participate in independent, international effort, for instance --

COMMISSIONER CARR: And it behooves us -- they are our baby, we want them to be the experts.

MR. BERNERO: Certainly.

COMMISSIONER CARR: I like EPA coming to them and asking them, I just don't want to spare them, you know, but we --

MR. BERNERO: Yes. It's to our distinct advantage.

COMMISSIONER CARR: It's imperative that we keep them technically capable.

MR. BERNERO: Yes. And an FFRDC's value is in proportion to its technical excellence, and that, too, is in proportion to this open pursuit of knowledge in whatever forum. And, so, we --

COMMISSIONER CARR: I guess what I'm really asking, does their contract allow them to use expenses for

that kind of purpose?

MR. BERNERO: Definitely.

COMMISSIONER CARR: Okay.

CHAIRMAN ZECH: All right. Thank you very much.

Commissioner Rogers?

COMMISSIONER ROGERS: Well, just following up on that, I know we have to be very careful of how we expend our funds, and how we set our priorities, and so on and so forth, but I think we do have to recognize that if they are going to keep themselves on the cutting edge, that they have to have flexibility to some extent, in pursuing things that are at the cutting edge that turn up in their work because it would be, in my view, a great pity to have to cut something off that they had started to discover in the course of this work because it doesn't really exactly fit our own predetermined priorities.

Now, those are delicate questions and questions of allocation of resources, but I think we have to recognize that somehow, if we're going to carry through on that objective of encouraging them in every way to be at the cutting edge, that we can't stop them short of staying there once they get there.

So, it's just something for us to keep in mind. It is difficult for an applied activity directed towards a mission such as this, to allow itself to get into some

things of that sort. It's very tricky how to make those decisions, but I would simply say if we really do -- and I believe that that's the way for us to go -- to have the highest quality effort there, to allow some mechanism for not cutting off exceedingly important and promising avenues that develop in the course of carrying out their mission because they diverge a little bit from what we had thought they should be doing.

The other thing is, DOE is conducting an independent regulatory analysis of an exploratory shaft. Is the Center conducting an independent regulatory analysis to support our reviews, of the exploratory shaft?

MR. BERNERO: I'm not sure I understand the question. A regulatory analysis of --

MR. THOMPSON: Design basis analysis of how the shaft meets our regulations?

MR. BERNERO: Well, this product here is for site characterization and exploratory shaft.

COMMISSIONER ROGERS: And the shaft is part of R-9.

MR. BERNERO: Yes, that was part of the product R-9.

COMMISSIONER ROGERS: Okay.

MR. BERNERO: And, of course, they are reviewing the ESF design analysis document, as part of their SCP

activity.

CHAIRMAN ZECH: Anything further?

COMMISSIONER ROGERS: No, I don't think so. I've learned a lot today.

CHAIRMAN ZECH: Commissioner Curtiss?

COMMISSIONER CURTISS: Just two or three quick ones. What is the current schedule for completing--baselining and completing the program architecture? When do we expect to have that work done front to back, or across Part 60, in its entirety?

MR. BERNERO: The milestones I've listed, completing the selected analyses, September '89. Going beyond that point, let me turn to -- well, get up to the microphone and explain that.

CHAIRMAN ZECH: Identify yourself for the Reporter, please.

MR. BROWNING: Bob Browning, Division of High-Level Waste Management. Our current plan -- the way we call baselining is it will be done by December of this year, if we maintain our current schedule.

As you noticed on the charts that Bob Bernero was using, we're going to be walking through three specific examples throughout the whole logic problem, and that will be the determining factor on giving us some confidence that the logic structure and the outline for

the data fields that are going into the program architecture are going to be sufficient, and that gives us the period between that point in time and the end of the year, to complete baselining and factoring any lessons learned from those three examples.

So, it would be by the end of this year, calendar year.

COMMISSIONER CURTISS: I guess let me ask it a little bit more specifically. The back-up slide on number 5 that lists the 22 steps that will be undertaken in this area, when will that process be complete for all of the Part 60 regulations?

MR. BROWNING: For all the Part 60 regulations, the process itself may not be done until we actually get the license application. This is an ongoing process, but the structure will be there. Some data fields won't get filled in until DOE completes its site characterization, for example.

COMMISSIONER CURTISS: I'm not asking the question very clearly, I guess. The question that I have is, at what point will we know, through the program architecture, for all of our Part 60 regulations, what the existing uncertainties are?

MR. BROWNING: By the end of this year, the regulatory uncertainties -- we want to have them all

buttoned up by the end of this year.

COMMISSIONER CURTISS: Okay.

CHAIRMAN ZECH: Thank you very much.

COMMISSIONER CARR: Identified, not buttoned up.

MR. BROWNING: Identified, not necessarily resolved.

COMMISSIONER CURTISS: I understand that. Then we would, in the regulatory strategy paper, either through rulemakings or generic technical positions, branch technical positions, decide how it is that we want to go about resolving those.

MR. BROWNING: Exactly.

COMMISSIONER CURTISS: I guess one question on the chronology or the timing of doing that. For an issue like substantially complete containment where we know today that there are significant uncertainties in the existing regulations and where those uncertainties may become an issue as early as our comments on the SCP, how is it that we coordinate the resolution of the uncertainties, with a regulatory response that we have to give before we resolve the uncertainties? In other words, how do we comment on the SCP on this issue, before the regulatory uncertainty is resolved?

MR. BERNERO: Well, you will always be tantalized with that, throughout this process. We go

through the system analysis. We identify uncertainties that may be imminently resolvable right off the bat, or require iteration even to identify the approach to resolve them. And let me just use an example to explain it.

Right now -- and I'm probably inserting a good deal of my own personal opinion into this -- the need for a performance assessment on the table, coming out of this product, is something that I see -- and, certainly, will be shared with DOE in our comments on the site characterization plan, and there's a delicate balance here.

Our comments on the site characterization plan can range from you absolutely, definitely must have a performance assessment in it, or it looks like you ought to have the performance assessment available, or, in the other extreme, you don't need it at all -- you know, we are silent on the subject.

I think we will always have that difficulty, that the conclusion is not fully right, and yet we have a regulatory responsibility to give fair and open comment at this stage, on the site characterization plan, and my own feeling is that we must at least communicate that intermediate or minimal comment to DOE, and we'll have the same thing with substantially complete containment because we will, in the site characterization plan, I'm sure,

identify interpretations of some subparts of that where we think DOE is going off on a skew.

COMMISSIONER CURTISS: What you're saying is that, in some instances, just because of the timing of the Center's effort, there may be areas where there are uncertainties that we have to come to grips with before we're actually prepared to formalize the agency's position in a rulemaking.

MR. THOMPSON: Well, I'm not sure we have to come to grips with it. We certainly have to identify and identify that's an area that we will be pursuing to further clarify for purposes of rulemaking but, remember, the site characterization plan is a living document also, by DOE. They update that every, you know, six months, you know, and the dialogue continues as we go through the process of actually implementing the site characterization plan through the study plans, and they'll make programmatic changes which, you know, we'll have dialogue on, so these may be identified as key areas that need to be focused on by both DOE and NRC, and that may be the focus of the comments and about what you can do with at this time frame.

COMMISSIONER CURTISS: Two other quick questions. On the hastelloy issue, as you've described that, we have underway there an effort that looks to me

like sort of a baseline effort or gives us a reference material that we could use in evaluating the two materials that DOE is proposing.

What do we do if our evaluation of hastelloy at the Center turns out to show that that's a preferable material?

MR. BERNERO: In fact, there are some that would say if we have a research program in a good material, and it happens to be better than the chosen material, that there's sort of a jawbone momentum that it gets, and it drives the program. It could. It could be, when we look at the regulatory requirements, the objectives that I cited -- the 10 CFR 60.21 which is look at the conservative end of the spectrum, and the other which is look at the lifetime of containment -- it could be that we have the technical basis to say to DOE, not "You will choose this material" because the DOE program has to get an awful lot more material data than we're getting-- remember, we're doing kind of an overview kind of research on materials -- but we could have enough information for us to say with confidence, "DOE, your program is inadequate because you didn't adequately consider at least this one other alloy, and here's our technical data that says your program isn't acceptable until you do".

COMMISSIONER CARR: But not if they met the 300.

MR. THOMPSON: Right.

MR. BERNERO: Ah, but wait a minute. You see, that is a key policy decision that you Commissioners have. If you look and remember the rulemaking, it isn't the way I portrayed it, that you have to have at least 300. I won't give you credit for more than a thousand, but I'm going to pull, push, cajole, and bump you to try to get you well over a thousand.

COMMISSIONER CARR: I didn't say that, you did.

(Laughter.)

MR. BERNERO: I know. I know. You didn't say it --

COMMISSIONER CARR: If that guy comes in with 301, he's met the regulation.

MR. BERNERO: Yes. Yes. But if he comes in and says, "I have here two alloys. Here is a 300-year can and here is a 350-year can", which satisfies the need to look at the conservative end of it, and it's not worth going for, you know, an extra 50 years. It isn't worth it. It costs twice as much, so you get the 300-year can. Will you consider that an acceptable response to your regulations?

MR. THOMPSON: Remember, we go through a performance evaluation. We would want to exactly know how we're going to do, and that is one barrier that we have to

look at. And if you have --

COMMISSIONER CARR: We won't know until we multiply all those factors at the end, if he used the 350-year can, he'd be sate, and if he uses a 300-year can, he's ansate, so --

MR. THOMPSON: That's right. He may, in fact, need to --

COMMISSIONER CARR: There's too many factors in that equation, but I certainly wouldn't throw out his can if he met our requirements.

MR. THOMPSON: You would not throw the can out if he met -- if he were able to meet the overall performance at the site.

COMMISSIONER CARR: But he won't know that.

MR. THOMPSON: He won't know that if --

MR. BERNERO: Mr. Carr, let me stipulate that if he's got a 300-year can, his overall performance assessment for a reasonably good site is going to be successful -- that is, he's less than the EPA standard. So, the can does meet the 300-year objective, and the can, in a system, meets the EPA performance objective, overall, although it is certainly at the low end of the defense in-depth objective. It's a test of the Commission regulation.

COMMISSIONER CURTISS: Defense in-depth is

defined as 300 years is acceptable. I mean, that is the defense in-depth.

CHAIRMAN ZECH: We're not trying to test the NRC regulations, we're trying to build a suitable, adequate site that will protect the public health and safety. So, you can talk --

COMMISSIONER CARR: And there's going to be --

CHAIRMAN ZECH: -- semantics all you want to, but we've given you a band to operate in because, you know, there are uncertainties, we recognize that, but it ought to be clear that because of the uncertainties, we would expect that you are going to try to meet better than the very minimum band that we give you, and if you have any question about that as you proceed during the process in the next months and years, you should come to the Commission and discuss this very fundamental question.

MR. BERNERO: Definitely. that's why we consider this array of requirements that we've often called a substantially complete containment set --

COMMISSIONER CARR: But to go back to his basic question, if everybody says, gee, hastelloy is what we're comparing everything to and everything else is down here and hastelloy is up here, then it's only a matter of money, if DOE can afford it or not afford, and if it's going to raise the price of a repository clear out of

sight, why, you know, that's their decision, not ours. Ours is whether what they've got meets it.

MR. BERNERO: That's right.

COMMISSIONER CURTISS: My question goes to whether our analysis of hastelloy and its use as a benchmark or a baseline will drive the container form to hastelloy, if that's the preferred container form, even though all three container forms satisfy our regulations.

MR. BERNERO: No, it wouldn't --

MR. THOMPSON: If they all satisfy -- the intent is not to do that. The intent, actually, is almost -- we talked earlier about keeping the center on the cutting edge of issues. This is kind of one of the areas where they identified an area that they felt was important to stay on top of the material aspects associated with the site, and that was one of the reasons that that was, you know, left in there, is that that gives them that capability to stay there.

It wasn't an effort to say we're going to try to push DOE there, but it certainly is to make sure that they are very knowledgeable of what's happening in the area of materials.

CHAIRMAN ZECH: It's just an effective standard to measure by. I mean, if they had picked something else, you'd have some pluses and minuses. They picked

hastelloy, everything is minus, you know.

COMMISSIONER CURTISS: Just one other quick request. The discussion that we had earlier, the transportation initiative that they have underway, the transportation risk study -- it's not clear to me, from what we've heard here, exactly what the focus of that is, whether it's narrowly focused on updating our NUREG-0170, for the purpose of examining our regulatory requirements, or whether it's a more broad ranging look at national transportation. I guess I don't want to go into it here because I know we've gone beyond, but what I guess I'd like to know at some point is just what is it that the transportation risk study is focusing on, how broad is it, and in their annual or their most recent report, it looked to me like, in one of the subelements, it was described as a much broader effort and, at some point, I'd like to have the staff explain, at least to me, what the focus of that is, on that point.

MR. THOMPSON: Okay.

MR. BERNERO: Uh-huh.

COMMISSIONER CURTISS: And that's all I have.

CHAIRMAN ZECH: Thank you very much.

If I understand you, Mr. Bernero, you've essentially summed up your evaluation of the role of the Center, by saying it's playing a very significant role and

is making considerable progress, is that correct?

MR. BERNERO: That's right, sir.

CHAIRMAN ZECH: Mr. Beckjord, before the Center was established, you had, essentially, responsibility, solely responsibility -- sole responsibilities for research in the waste management area.

Now that the Center is operating, moving from the startup to the operational phase, how do you evaluate its assistance to you, and would you have the same kind of an assessment that Mr. Bernero has? Is it doing the job for you that helps you carry out your responsibilities, to the extent it should?

MR. BECKJORD: Yes, I believe it is, Mr. Chairman. We're just getting underway. We've been working with them since last fall, on the transfer of programs. It's a little too early, I think, to judge on final results.

CHAIRMAN ZECH: But you're satisfied with the progress to-date?

MR. BECKJORD: We're certainly satisfied with the progress. With respect to this other question of whether all of the research should be done at the Center, Commissioner Carr suggested that if the guidance -- if we wanted to change the guidance, that we could ask to do that. I do have some thoughts on that subject, and I

think it would be appropriate for us to prepare a paper for you, on the long-range direction for research.

I think, myself, there are good reasons for doing some of the research at places other than the Center, having to do with getting the best people and facilities, and that type of thing. I think that, certainly, our intention is that most of the work will be done at the Center, but I don't see that it's possible for the Center to develop expertise in every area that we may find a need to explore.

CHAIRMAN ZECH: Well, I think such a paper would be useful. If you could prepare that and send it to the Commission, I think we'd be very interested in receiving it, getting your thoughts on that.

Well, let me just say, unless there are other questions from my fellow Commissioners, on behalf of the Commission, I'd like to thank the staff for a very informative and useful briefing here this morning. We're pleased to hear the progress that the Center is making, and it would certainly appear that they are progressing satisfactorily.

This is one of a series of briefings that the Commission has received over the past number of months, and we've heard from DOE, we've heard from the State of Nevada, we've heard from other parties, and we've heard

from the Center staff, itself, so this continuing series of briefings, I think, is very valuable for the Commission, to keep us informed as we proceed in this very important area.

The Center, itself, is playing a very significant role in the overall licensing framework, and providing, hopefully, in the future, to the Commission, the kind of information and solid background understructure that we need to make very important regulatory decisions. So, I think it will be important for the staff to continue working very closely with the Center, to make sure that as we look ahead, those regulatory decisions that are really not all that far away, will be made in a manner that we can all be confident.

We certainly recognize all the uncertainties. It's a very unique area, a very unique field, but I think it's important that the staff continue their very close work with the Center, and I am pleased to hear that both our NMSS and our research organization do feel that cooperation and progress is being made in a satisfactory manner.

And it's important we continue these briefings, so we will expect to hear from you again, periodically, and -- but I would just like to add, finally, that, again,

we don't expect you to wait for these periodic briefings. We expect to be informed as you go along, and keep us informed with information papers or in any other format you wish to get information to the Commission because it is certainly now, and will be even more in the future, one of the highest priorities of this Commission, in my judgment. So, the Commission is very actively interested in pursuing and staying very close to this program.

Are there any other final comments from my fellow Commissioners?

(No response.)

Thank you very much, for a very fine briefing. We stand adjourned.

(Whereupon, at 11:18 a.m., the meeting was adjourned.)

CERTIFICATE OF TRANSCRIBER

This is to certify that the attached events of a meeting of the United States Nuclear Regulatory Commission entitled:

TITLE OF MEETING: BRIEFING ON STATUS OF ACTIVITIES WITH THE CENTER FOR NUCLEAR WASTE REGULATORY ANALYSIS

PLACE OF MEETING: ROCKVILLE, MARYLAND

DATE OF MEETING: APRIL 6, 1989

were transcribed by me. I further certify that said transcription is accurate and complete, to the best of my ability, and that the transcript is a true and accurate record of the foregoing events.

Phyllis Young

Reporter's name: PHYLLIS YOUNG

STATUS OF CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

APRIL 6, 1989

BRIEFER: R. BERNERO

OUTLINE OF BRIEFING

- INTRODUCTION/STATUS OF CNWRA OPERATIONS
- TECHNICAL ASSISTANCE ACTIVITIES
- RESEARCH ACTIVITIES
- FUTURE PLANS AND ACTIVITIES

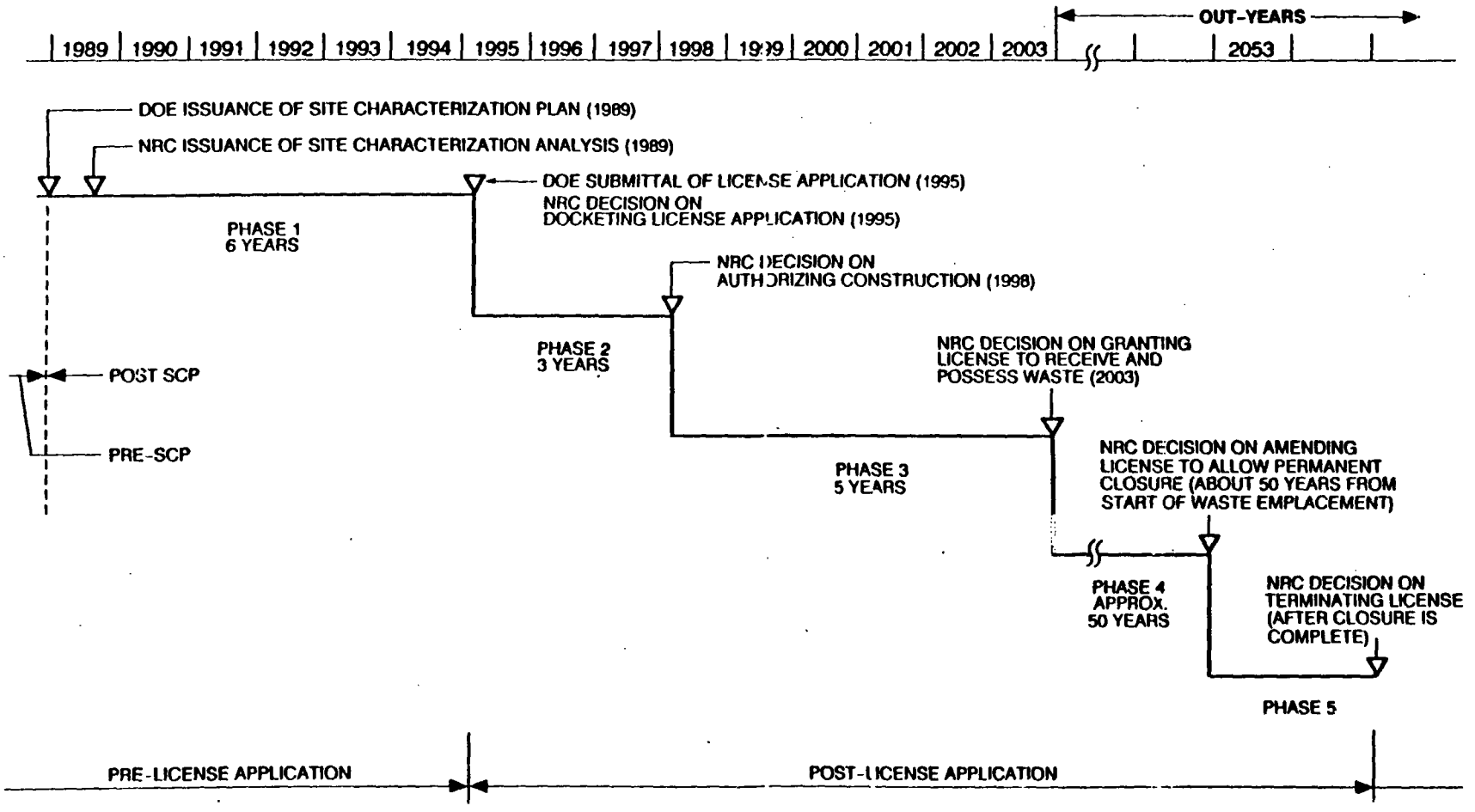
SLIDE 1

STRATEGY (SECY 88-285) AND SCHEDULE FOR HLW LICENSING:

- 1988-1992: KEY RULEMAKINGS
- 1995: APPLICATION SUBMITTED
- 1998: LICENSING DECISION

SLIDE 2

PHASES OF THE REPOSITORY LICENSING PROCESS



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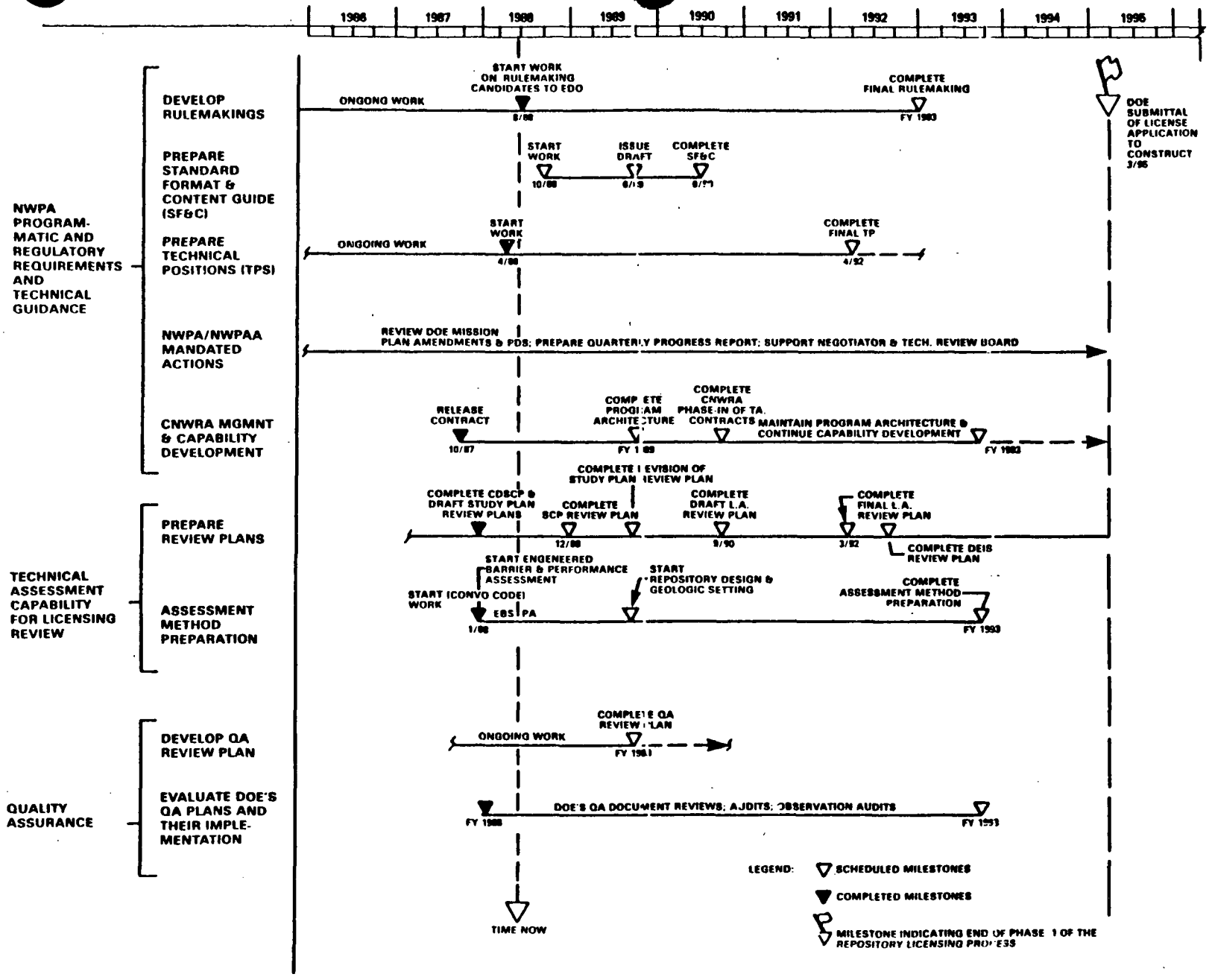
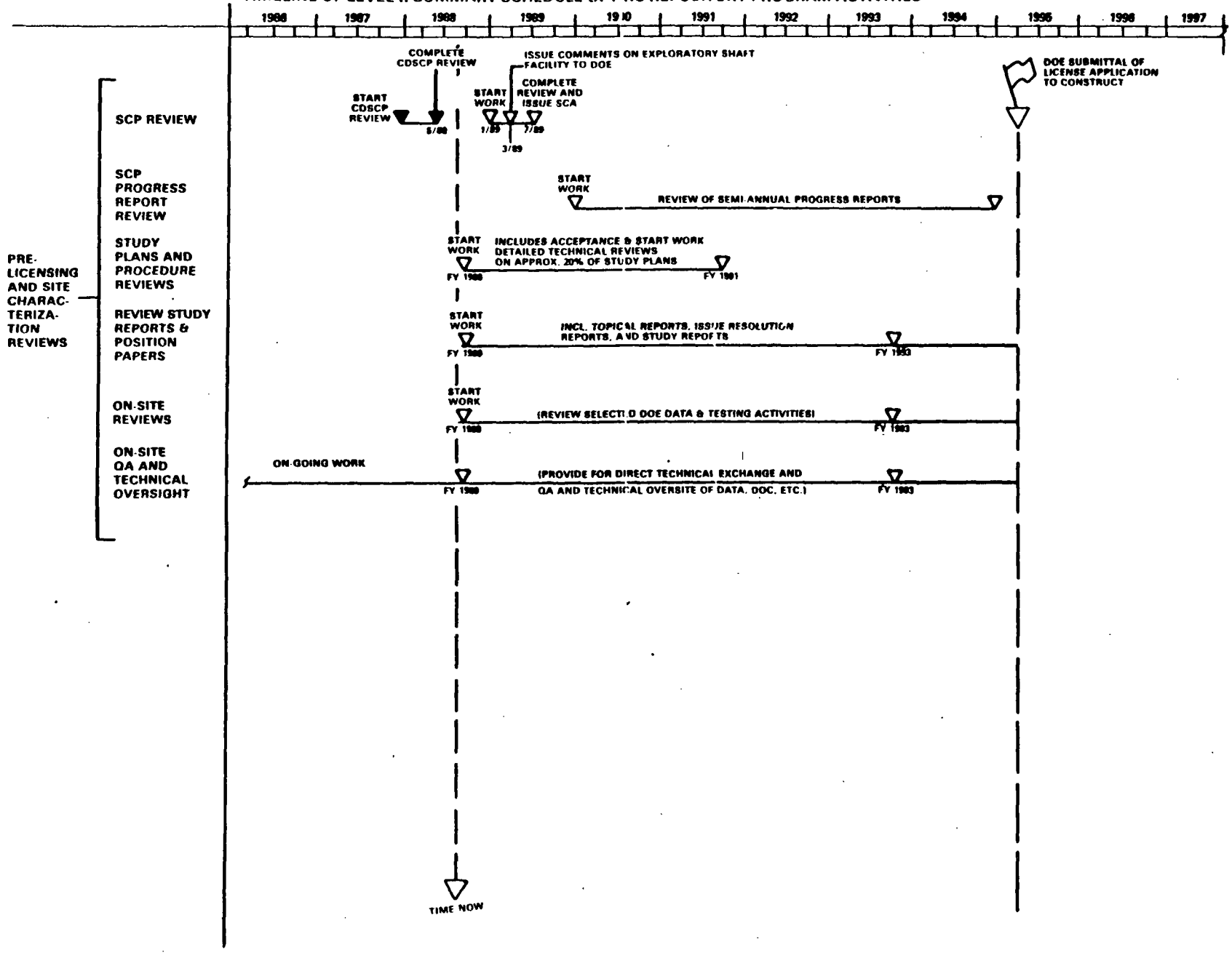
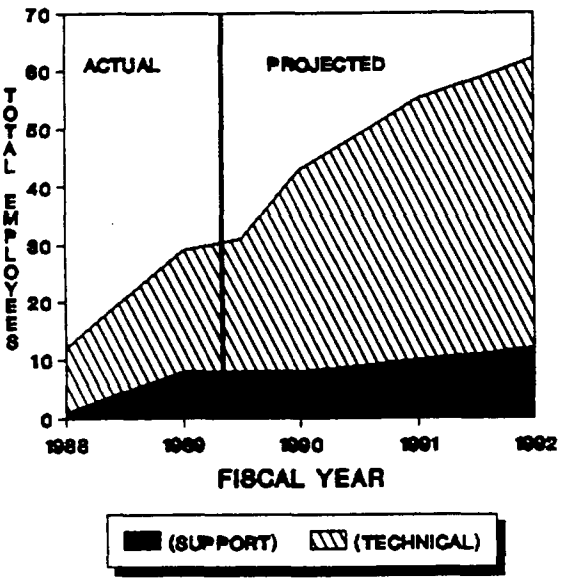

TIMELINE OF LEVEL II SUMMARY SCHEDULE OF REPOSITORY PROGRAM ACTIVITIES
1986
1987
1988
1989
1990
1991
1992
1993
1994
1995
NWPA PROGRAM-MATIC AND REGULATORY REQUIREMENTS AND TECHNICAL GUIDANCE
DEVELOP RULEMAKINGS
START WORK ON RULEMAKING CANDIDATES TO EDO
ONGOING WORK
8/88
COMPLETE FINAL RULEMAKING
FY 1993
PREPARE STANDARD FORMAT & CONTENT GUIDE (SF&C)
START WORK
ISSUE DRAFT
COMPLETE SF&C
10/88
PREPARE TECHNICAL POSITIONS (TPS)
START WORK
ONGOING WORK
4/88
COMPLETE FINAL TP
4/92
NWPA/NWPAA MANDATED ACTIONS
REVIEW DOE MISSION PLAN AMENDMENTS & PDS; PREPARE QUARTERLY PROGRESS REPORT; SUPPORT NEGOTIATOR & TECH. REVIEW BOARD
CNWRA MGMNT & CAPABILITY DEVELOPMENT
RELEASE CONTRACT
10/87
COMPLETE PROGRAM ARCHITECTURE
FY 1 88
COMPLETE CNWRA PHASE-IN OF TA CONTRACTS
MAINTAIN PROGRAM ARCHITECTURE & CONTINUE CAPABILITY DEVELOPMENT
FY 1993
TECHNICAL ASSESSMENT CAPABILITY FOR LICENSING REVIEW
PREPARE REVIEW PLANS
COMPLETE REVISION OF STUDY PLAN REVIEW PLAN
COMPLETE CDSCP & DRAFT STUDY PLAN REVIEW PLANS
COMPLETE SCP REVIEW PLAN
12/88
COMPLETE DRAFT L.A. REVIEW PLAN
9/90
COMPLETE FINAL L.A. REVIEW PLAN
3/92
COMPLETE DEIS REVIEW PLAN
ASSESSMENT METHOD PREPARATION
START ENGENEERED BARRIER & PERFORMANCE ASSESSMENT
START ICONVO CODE WORK
EBS PA
1/88
START REPOSITORY DESIGN & GEOLOGIC SETTING
COMPLETE ASSESSMENT METHOD PREPARATION
FY 1993
QUALITY ASSURANCE
DEVELOP QA REVIEW PLAN
COMPLETE QA REVIEW PLAN
ONGOING WORK
FY 1988
EVALUATE DOE'S QA PLANS AND THEIR IMPLE-MENTATION
DOE'S QA DOCUMENT REVIEWS; AUDITS; OBSERVATION AUDITS
FY 1988
FY 1993
DOE SUBMITTAL OF LICENSE APPLICATION TO CONSTRUCT 3/95
TIME NOW
LEGEND:
SCHEDULED MILESTONES
COMPLETED MILESTONES
MILESTONE INDICATING END OF PHASE 1 OF THE REPOSITORY LICENSING PROCESS

TIMELINE OF LEVEL II SUMMARY SCHEDULE OF NRC REPOSITORY PROGRAM ACTIVITIES



CNWRA STAFFING
FY1988 - FY1992



SLIDE 3

TECHNICAL ASSISTANCE PROJECTS:

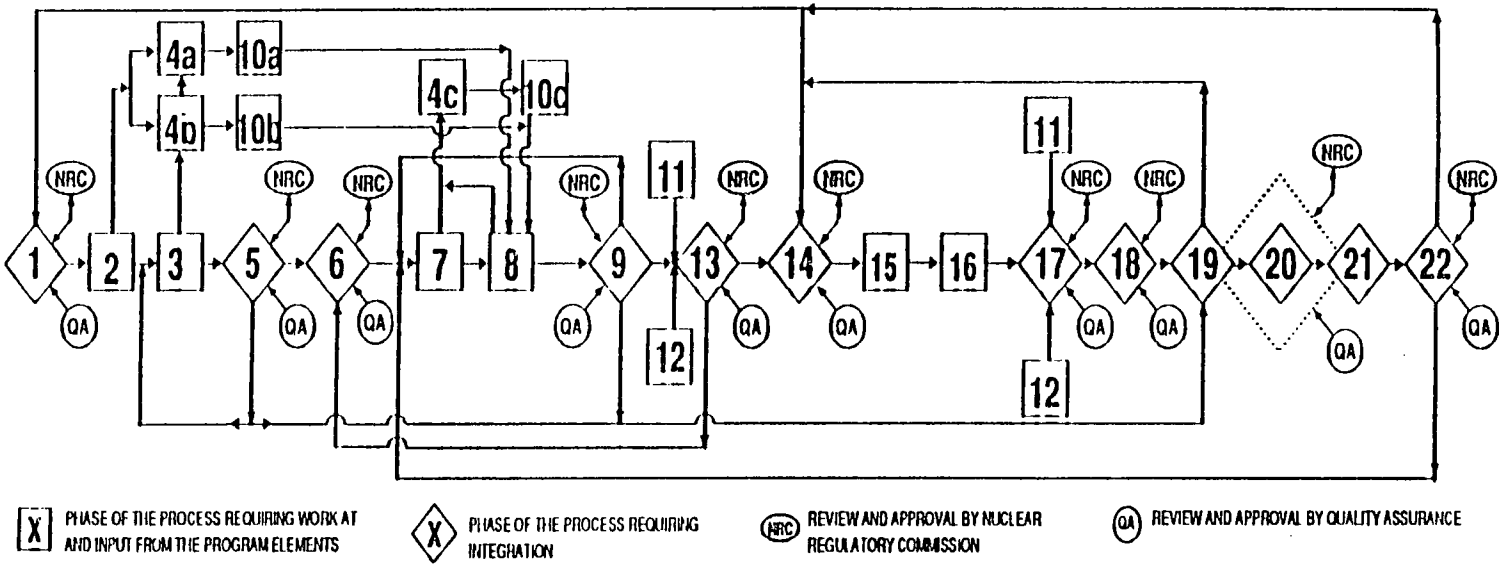
- SYSTEM ANALYSIS (PROGRAM ARCHITECTURE)
- ENGINEERED BARRIERS -- COMPLIANCE DETERMINATION
- TRANSPORTATION RISK STUDY
- SCP AND EXPLORATORY SHAFT FACILITY (ESF) REVIEWS

SLIDE 4

CONTRACT REQUIREMENT FOR SYSTEM ANALYSIS:

"THE CENTER SHALL DEVELOP CAPABILITY TO PROVIDE SYSTEMS ENGINEERING AND INTEGRATION SUPPORT TO NRC AND SHALL RECOMMEND A PROGRAM ARCHITECTURE ... BASED ON A COMPLETE REGULATORY SYSTEMS ANALYSIS OF RELEVANT STATUTES, REGULATIONS, REGULATORY FINDINGS REQUIRED OF THE COMMISSION AND DOE'S LATEST PROGRAMMATIC MILESTONES."

SLIDE 5



[X] PHASE OF THE PROCESS REQUIRING WORK AT AND INPUT FROM THE PROGRAM ELEMENTS

(X) PHASE OF THE PROCESS REQUIRING INTEGRATION

(NRC) REVIEW AND APPROVAL BY NUCLEAR REGULATORY COMMISSION

(QA) REVIEW AND APPROVAL BY QUALITY ASSURANCE

1. IDENTIFY POTENTIALLY APPLICABLE REGULATIONS
2. ANALYZE REGULATORY REQUIREMENTS
3. IDENTIFY AND LIST ELEMENTS OF PROOF
4a. IDENTIFY AND DESCRIBE INSTITUTIONAL UNCERTAINTIES
4b. IDENTIFY AND DESCRIBE REGULATORY UNCERTAINTIES
4c. IDENTIFY AND DESCRIBE TECHNICAL UNCERTAINTIES
5. INTEGRATE AND REVIEW REGULATORY REQUIREMENTS; AND INTEGRATE, REVIEW, AND REVISE ELEMENTS OF PROOF
6. SELECT SUBSET OF REGULATIONS FOR FURTHER ANALYSIS BASED ON TIME CRITICAL NATURE
7. IDENTIFY BASIC APPROACH FOR COMPLIANCE DETERMINATION METHODS (REVISE AT SUBSEQUENT ITERATIONS)
8. IDENTIFY INFORMATION REQUIREMENTS
9. INTEGRATE, REVIEW, AND REVISE COMPLIANCE DETERMINATION METHODS, ELEMENTS OF PROOF, AND INFORMATION REQUIREMENTS
10a. IDENTIFY INSTITUTIONAL UNCERTAINTY QUESTIONS
10b IDENTIFY REGULATORY UNCERTAINTY QUESTIONS
10c. IDENTIFY TECHNICAL UNCERTAINTY QUESTIONS
11. OBTAIN DOE "ISSUES", INFORMATION NEEDS AND UNCERTAINTIES
12 OBTAIN STATE, TRIBE, AND OTHER AFFECTED PARTIES "ISSUES", INFORMATION NEEDS AND UNCERTAINTIES
13 INTEGRATE, CONSOLIDATE, AND RANK UNCERTAINTIES AND UNCERTAINTY QUESTIONS (INCLUDING DOE AND STATE ITEMS)
14. IF UNCERTAINTY, UNCERTAINTY QUESTION, OR INFORMATION REQUIREMENT IS UNRESOLVED, FLAG AS OPEN ITEM, SELECT ITEMS FOR NRC ACTION; IDENTIFY OTHER ACTION PARTIES
15. IDENTIFY UNCERTAINTY REDUCTION METHODS AND RELATED INFORMATION REQUIREMENTS; SPECIFY ALTERNATE NRC PROGRAMS FOR UNCERTAINTY REDUCTION
16. DEVELOP COSTS, SCHEDULES, AND LEAD TIMES FOR NRC PROGRAMS
17. ANALYZE ALTERNATIVES AND NRC PROGRAM TRADEOFFS
18. RECOMMEND NRC PROGRAM INCLUDING OVERALL RESEARCH PROGRAM PLAN
19. DEVELOP AND DISPLAY NETWORK AND CRITICAL PATH FOR EACH REGULATORY REQUIREMENT
20. DEVELOP AND DISPLAY NETWORK FOR TOTAL PROGRAM
21. CONTROL AND DOCUMENT PROGRAM STRUCTURE AND CHANGES
22. CONDUCT NRC PROGRAM

Fig. 1 - Process Diagram for Developing and Maintaining the Program Architecture

CENTER FOR NUCLEAR WASTE REGULATORY ANALYSES

TECHNICAL OPERATING PROCEDURE

Proc. TOP-001

Revision 1

BACKUP

SYSTEM ANALYSIS STATUS:

- 4/88: COMPUTER CAPABILITY
- 12/88: SYSTEM APPROACH TO REGULATORY ANALYSIS DEMONSTRATED
- 4/89: ANALYSIS OF REGULATORY UNCERTAINTIES, RE: SCP AND ESF

SLIDE 6

SYSTEM ANALYSIS STATUS: (CONT'D)

- 4/89: ANALYSIS OF PART 60 LICENSING AND TECHNICAL CRITERIA, RE: REGULATORY ACTIONS
- 9/89: COMPLETE SYSTEM ANALYSIS OF EROSION, SUBSTANTIALLY COMPLETE CONTAINMENT, AND ADVERSE GEOCHEMICAL EFFECTS

SLIDE 7

ENGINEERED BARRIERS STATUS:

- 7/88: CONVO CODE EVALUATED AND ENHANCEMENTS INITIATED
- 10/88: ANALYSIS OF FAST PROBABILISTIC PERFORMANCE ASSESSMENT METHODOLOGY INITIATED
- CONTINUE ENHANCEMENTS OF CODE/METHODOLOGY

SLIDE 8

TRANSPORTATION STATUS:

- 1977: TRANSPORTATION EIS (NUREG-0170) PUBLISHED
- 1988: INITIATED TRANSPORTATION RISK STUDY
- 9/89: INTERIM REPORT
- 9/90: FINAL REPORT VALIDATING OR REVISING NUREG-0170 FINDINGS

ISSUE:

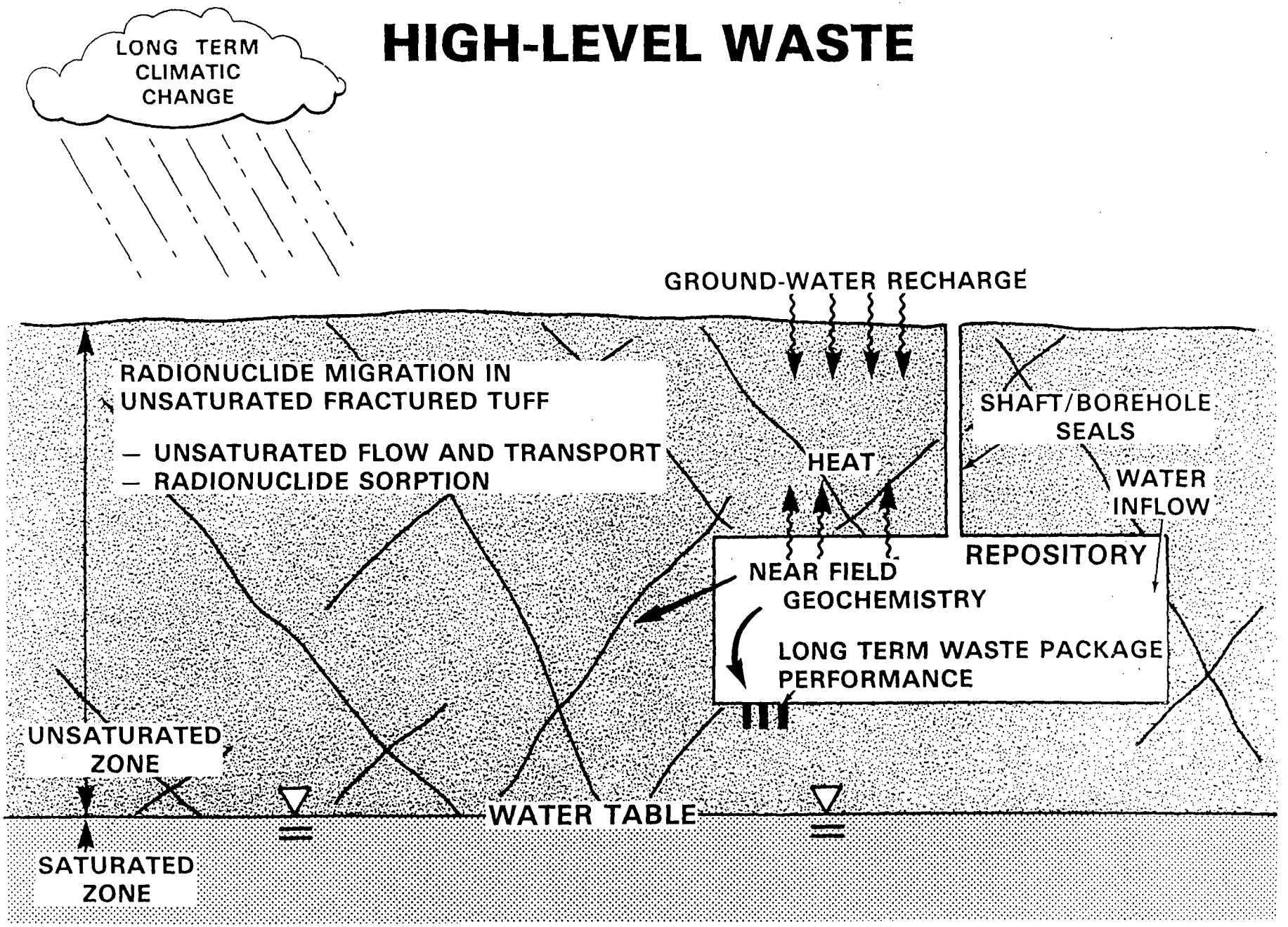
- UPDATED EIS OR CONTRACTOR REPORT?

SLIDE 9

SCP AND ESF REVIEW STATUS:

- 2/89: COMMENTS ON ENGINEERED BARRIER PORTIONS OF THE SCP
- 2/89: COMMENTS ON REPOSITORY DESIGN, CONSTRUCTION, AND OPERATIONS PORTIONS OF THE SCP
- 3/89: COMMENTS ON GEOLOGIC SETTING PORTIONS OF THE SCP
- 3/89: COMMENTS ON DESIGN ACCEPTABILITY ANALYSIS

HIGH-LEVEL WASTE



BACKUP

RESEARCH PROJECTS:

- INTEGRATED WASTE PACKAGE EXPERIMENTS
- GEOCHEMISTRY
- THERMOHYDROLOGICAL PHENOMENA
- SEISMIC/ROCK MECHANICS

SLIDE 11

INTEGRATED WASTE PACKAGE EXPERIMENTS:

° REGULATORY OBJECTIVES:

- 10 CFR 60.113(A) -- 300-1000 YEAR PERIOD

- INDEPENDENT EVALUATION OF 10 CFR 60.21(D) -- ALTERNATIVES PRODUCING LOWER RELEASES

SLIDE 12

INTEGRATED WASTE PACKAGE STATUS:

- MATERIALS BEING ACQUIRED AND LABORATORY FACILITIES UNDER PREPARATION
- SCOPING TESTS BEGUN
- PEER REVIEW OF TECHNICAL APPROACH (HASTELLOY AS "REFERENCE MATERIAL"), 6/89
- DOE FINAL SELECTION OF TWO CANDIDATE MATERIALS, ANTICIPATED FALL 1989

SLIDE 13

GEOCHEMISTRY RESEARCH:

° REGULATORY OBJECTIVES:

- 10 CFR 60.21(c) -- SITE GEOCHEMISTRY
- 10 CFR 60.122(B) -- FAVORABLE GEOCHEMICAL EFFECTS ON RADIONUCLIDE TRANSPORT AND FAVORABLE MINERALOGY
- 10 CFR 60.122(c) -- ADVERSE GEOCHEMISTRY PROCESSES AND CONDITIONS

SLIDE 14

GEOCHEMISTRY STATUS:

- PERFORMED MODELING FOR GEOCHEMISTRY AND WASTE PACKAGE EXPERIMENTAL DESIGN
- MODELED EVOLUTION OF GAS, WATER, AND MINERALS FOR REPOSITORY ENVIRONMENT
- EVALUATING MODELS OF TRANSPORT AND ADSORPTION; AND EVOLUTION OF WATER, GAS, AND SOLID PHASES
- EVALUATING GEOCHEMICAL DATABASES AND COMPUTER PROGRAMS

SLIDE 15

THERMOHYDROLOGICAL PHENOMENA:

- REGULATORY OBJECTIVES:
  - 10 CFR 60.21(c) -- THERMAL EFFECTS ON GEOHYDROLOGY AND GEOMECHANICS
  - 10 CFR 60.113(A) -- WASTE PACKAGE CONTAINMENT, CONTROLLED RELEASE FROM ENGINEERED BARRIER SYSTEM, GROUNDWATER TRAVEL TIME AND EXTENT OF DISTURBED ZONE

THERMOHYDROLOGICAL STATUS:

- TECHNOLOGY TRANSFERRED
- DESIGN AND INITIATION OF PRELIMINARY SEPARATE EFFECTS EXPERIMENTS, 4/89
- DESIGN UNSATURATED ZONE THERMOHYDROLOGICAL EXPERIMENTS, 1989

SLIDE 17

THERMOHYDROLOGICAL STATUS: (CONT'D)

- EVALUATE THERMOHYDROLOGICAL PHENOMENA INDUCED BY THE AGGREGATE OF EMPLACED HLW IN UNSATURATED GEOLOGIC MEDIA, 1989-1992

- EVALUATE UNSATURATED ZONE THERMO-HYDROLOGICAL PHENOMENA INDUCED BY A FEW PACKAGES OF HLW, 1989-1992

SLIDE 18

SEISMIC/ROCK MECHANICS:

° REGULATORY OBJECTIVES:

- 10 CFR 60.111(B) AND 60.133(c) -- RETRIEVABILITY
- 10 CFR 60.113(A) -- CONTAINMENT OF WASTE
- 10 CFR 60.133(E) -- SAFETY OF UNDERGROUND OPENINGS

SLIDE 19

SEISMIC/ROCK MECHANICS: (CONT'D)

- 10 CFR 60.122(c) -- POTENTIALLY ADVERSE CONDITIONS ARISING FROM SEISMIC ACTIVITY

- 10 CFR 60.131(B) -- PRECLOSURE PROTECTION AGAINST NATURAL PHENOMENA AND ENVIRONMENTAL CONDITIONS

SLIDE 20

SEISMIC/ROCK MECHANICS STATUS:

° REPORT OF LITERATURE STUDY

- DRAFT 2/89
- FINAL 5/89

° ANALYTICAL MODEL EVALUATIONS, 5/89

° LABORATORY STUDIES PLAN, 6/89

SLIDE 21

FUTURE DIRECTION FOR CNWRA:

° NRC MANAGEMENT REALIGNMENT

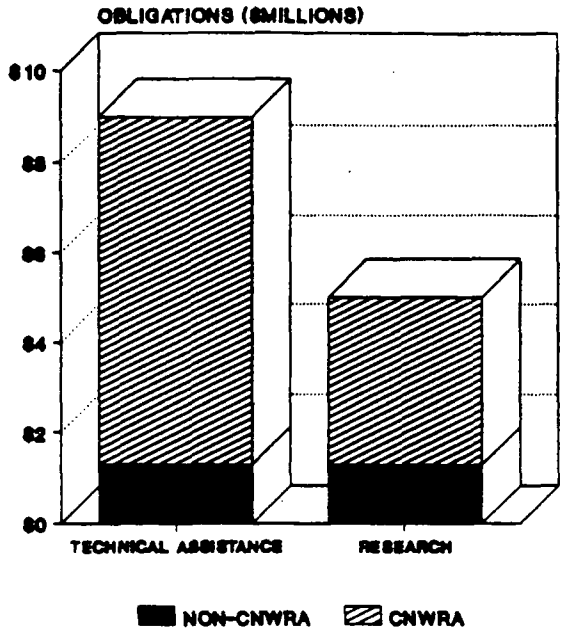
  - IMPROVE EFFECTIVENESS AND EFFICIENCY

  - INTEGRATE CNWRA PLANNING WITH NRC FIVE YEAR PLAN

° BALANCE LONG-TERM AND SHORT-TERM EFFORTS

SLIDE 22

DISTRIBUTION OF NWPA-RELATED FUNDS
FY1990



SLIDE 23

AREAS OF FUTURE CNWRA TECHNICAL ASSISTANCE:

- SELECTED RULEMAKINGS AND TECHNICAL POSITIONS
- PERFORMANCE ASSESSMENT
- SELECTED DOE STUDY PLANS
- FORMAT AND CONTENT GUIDE AND LICENSE APPLICATION REVIEW PLAN
- DOE PROJECT DECISION SCHEDULE AND MISSION PLAN AMENDMENTS

SLIDE 24

RESEARCH PROJECTS UNDER DEVELOPMENT:

- APPLICATION OF STOCHASTIC ANALYTICAL TECHNIQUES TO REPOSITORY LICENSING
- WORKSHOP ON NATURAL ANALOGS
- GEOCHEMICAL FIELD ANALOG FOR EVALUATION OF GROUNDWATER AT REPOSITORY SITE

SLIDE 25